NEW ZEALAND
JOURNAL OF
Agriculture

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This month's cover

Agriculture

Though farming generally in New Zealand today is tending to become increasingly mechanised, the station hack and working sheep dog are indispensable in a large part of the country. The hazardous nature of mustering on high-hill-country runs, particularly on rugged land where only walking mustering is possible, makes it essential for dog packs to be thoroughly trained and to have a high degree of intelligence and endurance. This month's cover, showing a musterer and his horse and dogs, has been painted by L. C. Mitchell from a photograph taken by National Publicity Studios on Esk Head station, a high-hill-country run in North Canterbury.

●

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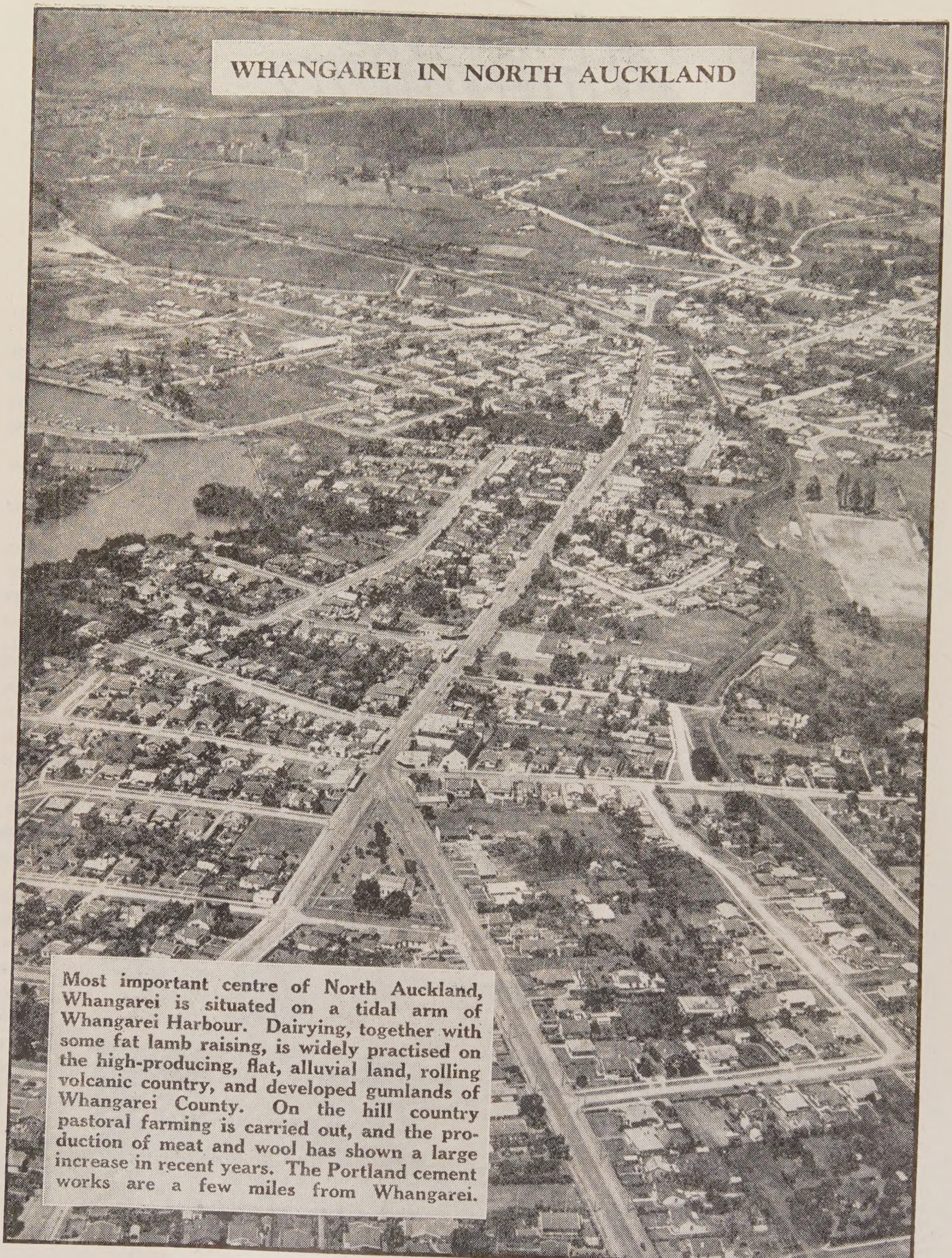
WHANGAREI IN NORTH AUCKLAND



Most important centre of North Auckland, Whangarei is situated on a tidal arm of Whangarei Harbour. Dairying, together with some fat lamb raising, is widely practised on the high-producing, flat, alluvial land, rolling volcanic country, and developed gumlands of Whangarei County. On the hill country pastoral farming is carried out, and the production of meat and wool has shown a large increase in recent years. The Portland cement works are a few miles from Whangarei.

[V. C. Browne photo.

Soil Conservation is Part of the War Against Want

"IF the soil, on which all agriculture and all human life depend, is wasted away by erosion, then the battle to free humankind from want is certainly lost. Soil washed away, soil blown away, fertile soil covered up with sterile soil, all are lost to human usefulness in our time. The attrition is constant, the loss is with us every day, and this at the very time when the war against want is being waged most hotly."

This blunt, almost brutal, warning comes from the pen of no mere theorist, but from that of one who has been at the nub of "the battle to free humankind from want"—Sir John Boyd Orr, formerly Director-General of the Food and Agriculture Organization of the United Nations. It is part of his foreword to "Soil Conservation: An International Study," an FAO publication which shows strikingly how advances in agricultural science can be nullified if there is insufficient good land to be farmed.

While reading this book I could not help wondering—as I am sure every New Zealander would—what message, what warning it may contain for this country. In our one century of development we have not yet imposed on the face of our land the penalties of mismanagement that bring themselves drastically to notice in, say, China or the United States of America. True, China is an ancient land even as history goes, with records of agriculture spanning four thousand years or more; pressure of population became acute in parts of the country centuries ago, and equally long ago man began his struggles with soil deterioration and with great natural catastrophes.

The United States, on the other hand—and here may lie New Zealand's warning—is historically a young country, but one in which exploitation of natural resources has been savage and rapid, encouraged by the "spirit of individual enterprise" fostered by Government and popular sanction. The result, as the FAO study admits, "has been appalling: Perhaps unequalled in human history has been the speed of destruction of forests, natural pasturage for game and domestic animals, and of the soil itself."

Soil erosion is the most spectacular result of bad land management. Gaping gullies and hillsides denuded of soil are visible and tangible evidences of great loss of natural resources. Perhaps an appraisal of losses of soil fertility caused by man's activity the world over would reveal that soil erosion accounts for most of them. For example, the National Resources Board of the U.S.A. estimates that the country's lands yearly lose 2,500,000 tons of phosphate through the harvesting of crops and grazing and almost 3,000,000 tons through erosion.

The history of agriculture in America has been a history of the conquest of the land and its resources, and often a history of destructive use. Most New Zealanders have had experience or have heard of the process of soil wastage which we are now seeking to reverse, but some of the examples illustrated in the FAO study stagger the imagination—gullies up to 200ft. deep in the State of Georgia, with great trees teetering to destruction on their brink, with the plough taken to the uttermost edge in a despairing effort to snatch a living from the vanishing land; gullies which relentlessly swallow up farmlands, buildings, and highways.

The long-embattled lands of China have not been surveyed completely to show the great extent of the soil losses caused by mismanagement, but what records there are point the problem which is doubly tragic in a hungry land. Soil eroded from hillsides and river-banks is carried down to the sea by the rivers in enormous quantities. For example, the silt content of the mighty Yellow River, sampled in August, 1934, was 38 per cent. by weight. The highest silt content found was in a branch of that river—the almost incredible figure of 63 per cent. by weight. Old Chinese records tell of land destruction and abandonment in the past few centuries—countless thousands of acres completely eroded or buried and abandoned; abandoned fields that have developed gullies that cut down to the very rock; rain water from high mountains sweeping over their outwash fans to carry away the rich surface soil and expose underlying pebble beds; silt and sand, spread by floods, sorted by dry winter winds which move sand dunes to invade good land.

Two great countries provide object lessons: China, with a long history of slow but inexorable occupation of the land; the United States, where the pressure on natural resources was dictated not so much by great need as by a restless, acquisitive drive for expansion and rapid exploitation. New Zealand, as a rich young pastoral country, lavishly endowed with a mild climate and a fertile soil, has a great advantage over countries which, by force of natural circumstances, must depend largely on arable farming. Yet already our land bears many a brutal scar of mismanagement. The policy of my Department has been, and still is, to conserve the farming lands of this country. This can be done only by adoption of sound farming methods and improvement of our widespread grassland areas. Advice and instruction, however, will not achieve the desired objective without the interest of land owners.

The land can feed many times its population, but New Zealand's role in the comity of nations is to help feed those less fortunate. Therefore we owe it to the world as well as to ourselves to restore a permanent balance in Nature and so a permanence in the use of our land resources. Again in Sir John Boyd Orr's words: "Soil waste is a world problem of the toughest kind. It is more than time to tackle it on that basis."

EDWARD CULLEN, Minister of Agriculture.

New Agreements with Britain for Bulk Purchase of Meat, Butter, and Cheese

NEW agreements with the United Kingdom Government for the bulk purchase of the Dominion's export meat and exportable surplus of butter and cheese were announced by the Minister of Marketing, the Hon. E. L. Cullen, recently.

BOTH agreements cover the next seven years, with the exception that in the meat agreement the contract for pig meats runs only to 1952, after which the quantities to be taken will be subject to review on the understanding that two full years' notice is given. The prices in both agreements for subsequent years after next season are subject to annual review, with a maximum variation up or down of 7½ per cent. in any one season on the price for the preceding season.

Meat Prices

The prices for pig meats for the next season are 76 per cent. higher than the level of the first bulk-purchase contract made in 1939 and the prices for all other meat are 70 per cent. higher.

"The increased price to be paid for our export meat next season is most satisfactory, particularly in view of the increase in the contract price for dairy products," said Mr. Cullen. "The contract also gives producers an assurance of a market for their products for the next seven years and over this period the price adjustment formula offers a protection against sudden or heavy movements in market prices. This assurance of reasonable price stability has placed producers in a position to plan confidently for an increased production.

"Having regard to these benefits a commitment has been made on behalf of producers to expand exports of meat to the United Kingdom as much and as quickly as possible. The target to be reached not later than 1955 is an additional 50,000 tons. The United Kingdom Government, for its part, has promised assistance in obtaining the imports of materials and machinery necessary to ensure this expansion of production.

"I would like to say that in negotiating this contract the Government had the advice and assistance of Mr. G. H. Grigg, chairman of the New Zealand Meat Producers' Board, and officers of the board who were present in London. Their advice on these matters has been most helpful to the Government."

Butter and Cheese Prices

Under the agreement reached between the British Minister of Food and the New Zealand Dairy Products Marketing Commission, which extends until July 31, 1955, the price for the 1948-49 season for butter will be 235s. (sterling) a cwt. f.o.b., with a corresponding increase for cheese.

The quantity to be made available for the 1948-49 season was 97 per cent. of the exportable surplus, calculated on a butterfat basis, said the Minister. The quantity was also subject to review annually and at any time if necessary for the procurement of essential commodities from other countries.

The negotiations had been carried out in an atmosphere of good will and had been completed in the expectation that the agreement reached would give a measure of long-term stability, which would encourage maximum production and be mutually advantageous to New Zealand and London, he stated.

The representatives of the commission who conducted the negotiations with the British Minister of Food were Mr. W. Marshall, chairman, Messrs. R. A. Candy and B. C. Ashwin, members of the commission, and Mr. G. M. Pottinger, general manager.

Increase of 1s. 6d. per Bushel in Maize Subsidy

AN increase of 1s. 6d. per bushel in the subsidy payable on all maize produced from crops to be sown during this spring and marketed next year through the Maize Marketing Committee was announced recently by the Minister of Marketing, the Hon. E. L. Cullen.

For the past three years the subsidy payable on all maize sold through the Maize Marketing Committee had been 1s. 6d. per bushel, but in view of the urgent necessity for increased production of maize for poultry-feeding purposes and after discussions with maize growers on present higher costs of production the increase had been recommended by the Economic Stabilisation Commission and approved by the Government, said Mr. Cullen. The basic monthly prices would remain at the present rates, commencing at 5s. 6d. in July, 1949, and rising to 6s. 2d. for deliveries during the period March to June, 1950, but with the subsidy of 3s. added, the price to the growers would now range from 8s. 6d. to 9s. 2d. per bushel, sacks extra, f.o.b. or on trucks at the grower's station, depending on time of delivery.

"This represents a very substantial increase and at these prices maize should prove a profitable crop in all districts climatically suitable for maize production," he said. "It is hoped that special efforts will be made by growers and merchants to obtain a very substantial increase in area this season."

Supplies of Wire for Farm Use

ALMOST 13,000 tons of wire of all types for farm use has already been purchased and confirmed against 1948 import licences, according to a statement made by Mr. F. P. Walsh, chairman of the Aid for Britain National Council. Normal annual requirements are about 14,000 tons, so that if the supplies already purchased come to hand within the licensing period, farmers' most acute needs should be eased this year. Realising the effect these shortages have had in restricting the fullest increase in farm production, the council has had the supply position constantly under attention and is continuing to press for the maximum additional supplies to be made available.

Mr. Walsh said that Wire Distributors Ltd. in a report to the council had advised that 10,036 tons of barbed and plain fencing wire and 2348 tons of baling wire were at present on order as follows: Belgium 8612 tons, Czechoslovakia 370 tons, U.S.A. 2277 tons, British Zone of Germany 625 tons, and France 500 tons.

These tonnages had been shipped or booked for shipment from the Continent and America by December 31, 1948. However, it was not possible to state how much would arrive in the Dominion by the end of 1948 or by any other definite date owing to many unavoidable factors which could delay delivery. It was inevitable that the delivery of a part of the tonnage would be delayed into 1949. Further, the tonnage booked in the U.S.A. was subject to the granting of export quotas and might therefore be reduced. In addition to the above confirmed purchases, token shipments of about 550 tons from the United Kingdom to meet orders placed in 1945 and 1946 were anticipated.

In the last three months, said Mr. Walsh, 486 tons of baling wire, 945 tons of plain galvanised wire, and 25 tons of galvanised barbed wire had been landed in the Dominion. New Zealand's normal annual requirements were 1250 tons of baling wire, 5000 tons of barbed wire, and 8000 tons of plain galvanised wire. If accrued demands over recent seasons were taken into account and if the 12,384 tons purchased arrived by March, 1949, it was anticipated that New Zealand would be fully covered for all requirements of hay-baling wire for next season, showing a major improvement in the supply of plain galvanised wire, and in a position where barbed-wire supplies still fell short of requirements.

Mr. Walsh pointed out, however, that the barbed-wire position would be further improved if unconfirmed supplies from a quarter at present under investigation came forward before the end of December.

Though these supplies would materially ease farmers' critical needs, an accumulation of orders during several years of shortage still demanded the greatest effort to make larger quantities available to the farmer to enable him to increase the production of food for Britain.

October is a Busy Month for Home Gardeners

By A. G. KENNELLY,
Instructor in Vegetable Culture, Christchurch.

THOUGH caution must still be exercised in sowing or planting frost-tender subjects, October is one of the busiest months for the home gardener. Damaging frosts can be expected in most South Island districts until about the second week in November, but in most northern districts frost-tender subjects such as tomato, cape gooseberry, egg plant, and pepper can be set out toward the end of the month. Late-autumn and winter greens should not be overlooked, and seed of savoy cabbage, broccoli, curly kale, leeks, and brussels sprouts can be sown. Actual dates of sowing, whether during October or November, depend mainly on district and variety.

SUCCESSIONAL sowings of salad vegetables should be attended to during October, and if the ground has warmed sufficiently, seed of half-hardy subjects such as dwarf and runner beans, melon, pumpkin, squash, marrow, and cucumber can be sown outdoors in districts north of Canterbury a few days before the last damaging frost usually occurs. Jerusalem artichokes can still be planted, and in southern districts it is not too late to plant asparagus. Silver beet, lettuce, cabbage, cauliflower, and even brussels sprouts can be set out if the seedlings are ready, and gaps can be filled in previously-planted rows. Successional plantings of early potatoes can be made or second-early or main-crop varieties planted, though where well-sprouted tubers are planted shallowly early in the month they, like those planted earlier, should be continually earthed up to prevent frost damage. Preparation of ground for successional sowings should be continued and soil can be made ready for planting out frost-tender subjects. Successional sowings of peas, carrots, beetroot, lettuce, turnips, and spinach can also be made.

Asparagus

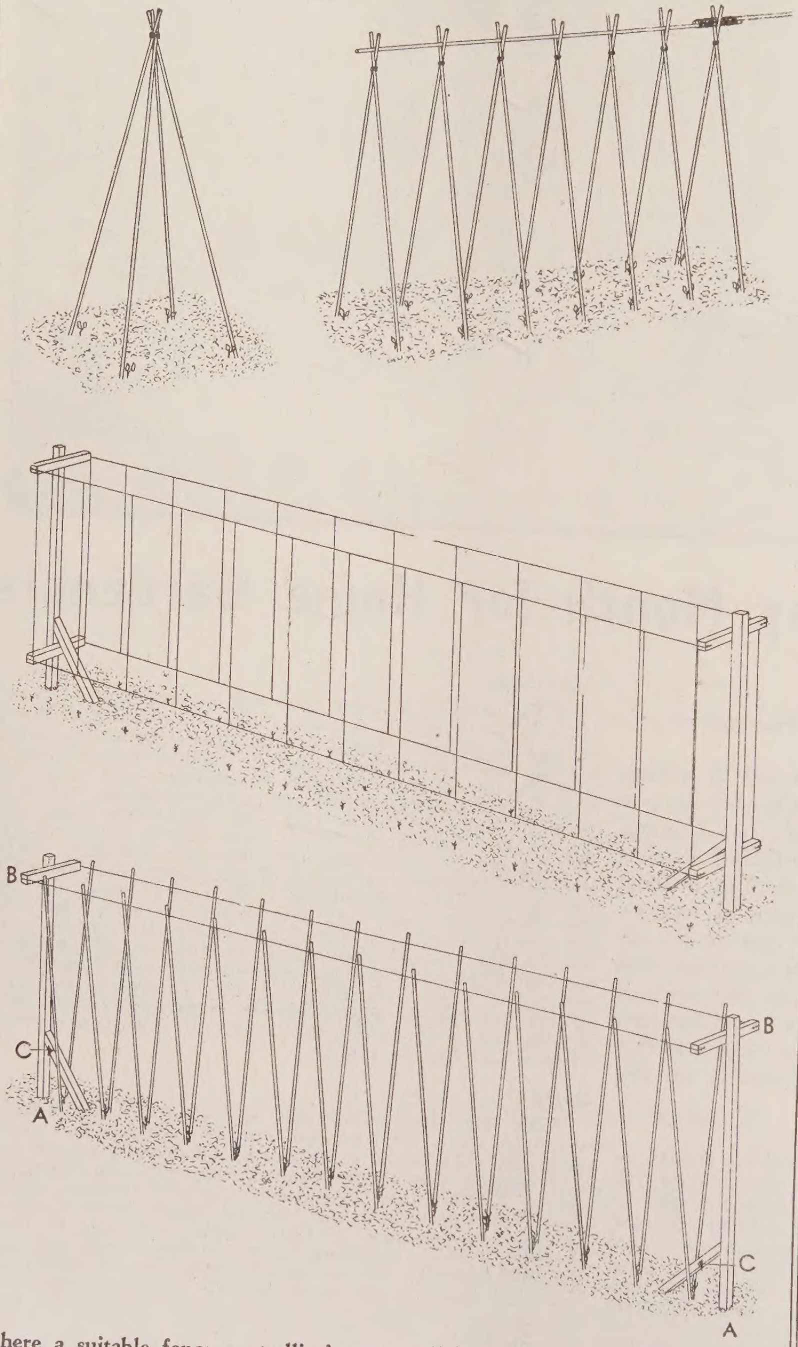
Most established asparagus will benefit from a weekly application of liquid manure made by soaking a quantity of animal manure in a large container of water. This is a safe liquid manure and useful at this time of year for subjects like spring cabbage, cauliflower, and silver beet. The period during which asparagus can be cut varies greatly according to the bed, and may range from six to ten weeks. Research workers have shown the harm likely to be done to young beds by too-early cutting. Only if the growing season is long and the plants well established should a cutting of not more than two weeks be made the third year from time of planting the seed (the second after setting out); in the fourth year the cutting period should not exceed about half the season or about four weeks. Thereafter cutting can continue each year for from six to ten weeks according to season of growth and vigour of the bed. Male plants give a larger yield than female plants, but it is rarely practicable to sort the sexes and discard the female plants.

Beans

The fact that beans are one of the most important vegetables is shown by the number of kinds and varieties available. All varieties except broad beans are frost tender and require warm conditions for germination and growth. In the North Island and Nelson an early sowing of either dwarf or climbing beans can be made from about mid-October to the end of the month according to district. Whether runner, climbing (pole), or dwarf beans are grown usually depends on the space available. If well grown, climbing beans yield more heavily than the dwarfs, and the newer stringless varieties are not inferior in flavour and quality.

Varieties of french or kidney bean (*Phaseolus vulgaris*), which are most commonly grown, can be divided into two groups—climbing and dwarfs—which in turn can be divided into tough-podded (the pods of which are tough and leathery when ripe) and edible-podded (the pods of which never become stringy). The climbing varieties of french bean are annuals, like the dwarfs, and should be distinguished from the runner bean (*Phaseolus multiflorus*), which is a perennial. Runner beans are not hardier than most varieties of French or kidney beans, but the flowers

METHODS OF SUPPORTING RUNNER BEANS



Where a suitable fence or trellis is not available runner or climbing (pole) beans can be supported as shown above. Upper left—Three to six poles pressed into the ground and tied together at the top. Upper right—Poles pressed into the ground and laced to a pole laid along the tops. Middle—Framework of horizontal wires and vertical strings. Lower—Framework of stout posts (A) with crossarms (B) connected by strong wires along which poles pressed into the ground are tied. The end posts are strengthened by supports (C).

usually set and develop pods with more certainty where conditions are less favourable. Scarlet Runner is the best known variety of runner bean, but improved strains such as Emperor Scarlet Runner, Princeps, Prizewinner, and Streamline are capable of yielding heavy crops of fine-quality beans which, if picked when young from plants that have been grown in favourable conditions, are not inferior to the best-quality french beans. Because the plant is a perennial, one advantage of growing the runner bean is that the roots, which are conspicuously thickened, can be left in the ground during the winter if conditions are favourable and will yield pods about a fortnight earlier than seed sown in spring.

Butter or waxpod beans are varieties of french bean that are fast coming into favour. The pods are stringless and the beans are a golden colour. There are tall and dwarf varieties of butter and waxpod, which should be planted a little later than the ordinary french beans. Good varieties are Pencil Podded Wax and Round Pod Kidney Wax (round-podded varieties) and Woods Centenary (butter) and Sure-Crop Black Wax (flat pods).

Thick, fleshy-shelled beans are also known as "snap" beans because the pods snap cleanly apart when bent far enough. Beans are also classed as green-shell and dry-shell. Green-shelled varieties are flat podded and are generally shelled and eaten like broad beans, though the pods of many varieties can be eaten when young like those of snap beans. Dry-shell beans are grown and used after the seed is mature or dry. Though the term haricot is given in France to all types of beans except broad beans, in New Zealand it is applied to certain types of dwarf and climbing beans, usually white-seeded (some small-seeded varieties of which are also known as navy beans), grown mainly for their dry seed. Good varieties which can be eaten in the green stage or used as haricots are White Dutch, Case Knife, and Stringless Black Valentine (Black Prince).

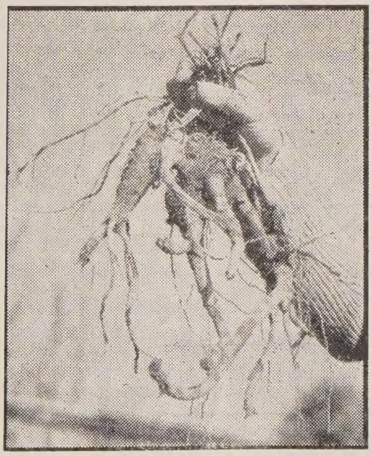
Where the diseases anthracnose and bacterial wilt are troublesome resistant varieties should be chosen (all runners are resistant). The Plant Diseases Division of the Department of Scientific and Industrial Research recommends the following dwarfs as being highly resistant: Burnley selection of Canadian Wonder (not ordinary Canadian Wonder) and Pale Dun. Black Prince, Blue Pod, and Woods Centenary (also known as Speckled Butter and Stringless Kidney Wax) are resistant, but to a less extent.

Beans are very susceptible to frost and can be grown successfully outside only during the warm period of the year. Cold weather or extreme changes in temperature adversely affect pollination of the flowers and, of course, the subsequent setting of the crop. Dryness at the roots is also a frequent cause of non-setting of the flowers and it is partly for this reason that sandy soils or soils containing very little humus should be avoided unless a supply of moisture can be assured. A cold snap or exceptionally-hot and -dry conditions during the development of the young pods may cause them to curl or hook or even to wither and die.

The soil should be well-drained and cultivated before sowing, and though it need not be more than moderately rich in organic material and nitrogen and potash, the addition of superphosphates has been found beneficial on most soils tested. Beans are tolerant of moderately-acid conditions, but lime should be applied at the rate of at least 3 to 4oz. a square yard some time before sowing if the land has not been dressed recently.

Climbing beans can be grown in rows without staking by slashing or pinching back excessively-long growths, but where growing conditions are favourable the best results are obtained if vines are staked or allowed to climb a support as shown in the illustrations on the opposite page. Though it is usually advisable in most districts to make more than one sowing of dwarf beans if continuity of supply is to be assured, most varieties of climbers will continue to bear until cut down by frost if the pods are picked regularly and are not allowed to develop fully. Dwarf beans on the other hand have the advantage of developing pods earlier, taking about seven to nine weeks, compared with about nine to ten weeks required by most climbing varieties.

Bean seed should be sown 1 to 2in. deep, but in exposed positions or on soils that tend to dry out a drill 2 to 3in. deep should first be drawn out and the seed pressed 1 to 2in. deep (according to whether the soil is heavy or light) in the bottom of it. Dwarf beans can be sown in single rows or double rows 6in. apart, with 2ft. between the rows. Seed should be sown or thinned 2 to 4in. apart; the richer the soil the greater the distance should be. Runner or climbing beans are usually sown or thinned to 6 to 8in. apart in double rows about 9in. apart and 3 to 4ft. from other vegetables.



[*Green and Hahn Ltd. photo.*

The runner bean is a perennial, and in well-drained soils in districts or situations where winter conditions are not too severe the thick, fleshy roots may be left and will shoot again when conditions are favourable, usually when frost danger is past.

[*Green and Hahn Ltd. photo.*

These knobby roots of Jerusalem artichoke *(Helianthus tuberosus)* are typical of the poorer strains often grown in New Zealand. Good strains are not inferior to good potatoes in shape.

Lima Beans (*Phaseolus lunatus*)

The culture of lima beans is similar to that of french beans, but it is often advisable to sow the seed a little later, even though the beans require a longer time to mature. They are more sensitive to cold than even snap or waxpod beans and succeed only in favourable districts. There are climbing and dwarf varieties available and the beans can be shelled and cooked like broad beans or used dry in the same way as haricot beans. They have a delicious flavour and are one of the most valuable members of the bean family.

Varieties: Baby Fordhook and Baby Potato are good varieties which combine hardiness and high yield with quality of small bean. King of the Garden is an excellent large pole variety.

Edible Soy Beans (*Soya hispida*)

Culture of edible soy beans is similar to that of bush lima beans. Like limas, they require a warm, moderately-rich soil and they can be eaten similarly when green. If they are used in the dry state, they should be soaked overnight before use or even until they commence to sprout. They are one of the most nutritive vegetables and have a high protein and fat content and also a high vitamin content. Good varieties are: Bansei, Kabott, and Giant Green.

Beetroot

Beetroot requires an open, sunny situation, as it rarely thrives if shaded, even if soil conditions are perfect. Soil and manurial requirements are in general similar to those of the carrot. The turnip-rooted varieties are usually chosen for early crops, as they mature quickly. Very early sowings often have a tendency to run to seed before full development, but the loss of part of the crop is not serious if a successional sowing of a globe or intermediate variety has reached a usable size. A variety such as Derwent Globe is excellent for sowing in October.

Beetroot is very sensitive to soil acidity, and lime is usually necessary on soils not recently dressed. A dressing of 3 or 4oz. a square yard well worked in some time before sowing usually gives satisfactory results. Too much should not be applied, as the element manganese becomes unavailable when the soil is very alkaline, and beets are very sensitive to manganese shortage. Beets suffering from manganese shortage can be recognised by the chlorosis (lack of green colouring matter) of their leaves. Beetroot requires plenty of moisture during growth. It transplants well if carefully lifted and replanted into moist soil, and if thinnings are replanted, they usually mature very little later than the rows from which they were lifted. Beetroot is a very good source of vitamin B_1 and a good source of vitamins A and B_2.

Carrots

A successional sowing of carrots or the main crop can now be sown as advised in last month's "Journal." Carrots are easy to grow and are very rich in vitamin A beside being a good source of vitamin B_1 and containing some of vitamin B_2 and vitamin C. They are available in a variety of shapes and sizes and maturity periods, which vary from about 65 to 100 days. The smaller intermediate or stump-rooted types are probably most popular and when sown thinly on light, free-working, sandy loams or peat soils do not require thinning. Where thinning is necessary it can often be delayed with advantage until the plants are large enough to be used in soups, salads, or stews. Where the carrot rust fly is troublesome care must be taken to refirm the soil after thinning. It is also advisable to water the remaining roots copiously and remove all traces of thinnings.

Though carrots thrive in deep, rich, well-drained and well-cultivated soils, care should be taken when building up the humus content to apply only well-rotted material in limited quantity so that when incorporated it forms a homogeneous mass with the soil; otherwise misshapen or forked roots may result. For this reason, too, the soil chosen for carrots should be well-cultivated and if possible free from stones or lumpiness, because if the

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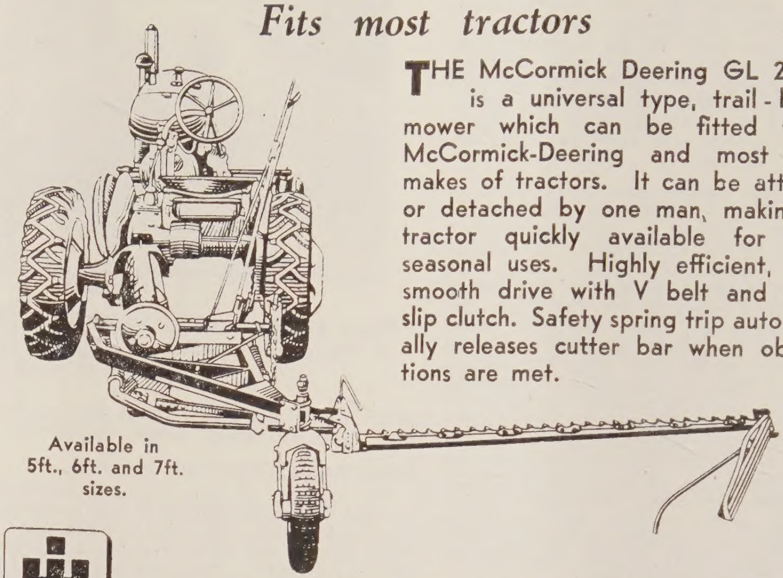

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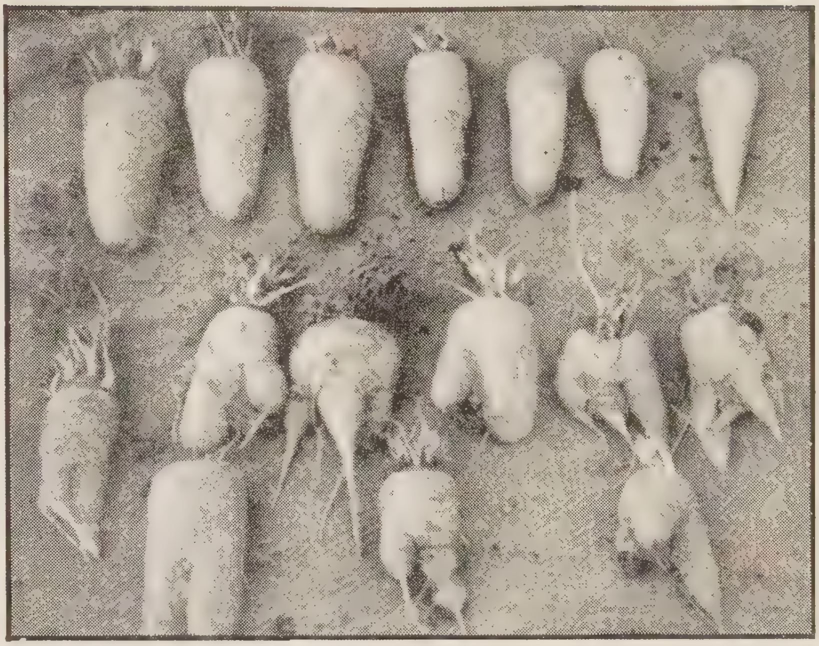


Misshapen or forked roots result if carrots come in contact with bulky fresh manure such as stable manure. The desirable type of carrot for table use is shown in the top row.

young tap-root encounters a stone, a mass of fertiliser, or a very wet or very dry layer, its normal development is likely to be aborted. Carrots are also likely to split on reaching maturity if (as often happens when the water-table is low) the soil becomes moist after being rather dry for a time. This tendency is usually accentuated by nitrogenous fertilisers.

Cucumbers

Though cucumbers are relatively low in vitamin content, they are a popular article of diet during summer. They are easily grown if a warm, sunny spot is available, and a few plants will help give welcome variety in most gardens. They are frost tender and an early start can be made by sowing them on a hotbed or under glass so that the plants can be set out in their permanent positions as soon as frost danger is past. The seedlings, like those of other cucurbits (marrows, pumpkins, etc.) and sweet corn, do not transplant well. This is mainly because the roots of these crops, unlike those of subjects such as tomatoes, cabbage, lettuce, and beets, are distinctly suberised; that is, they are covered by a fine, protective, corky layer of material called suberin, which slows up their absorption of water and consequently their ability to form new roots quickly. If plants are intended for transplanting, cucumber seed should preferably be sown in pots or paper packages; if sown in a box or in the soil of a frame, they should be lifted carefully with a quantity of surrounding soil before they are too large. Though cucumbers are grown commercially in some southern districts, the season must be reasonably good for the crop to succeed. However, in sunny situations in home gardens where shelter is available and a miniature hotbed can be made at each "hill" success can be assured. It is important that the ground has warmed sufficiently in the open before seed is sown.

Where transplanting is intended seed should be sown three to four weeks before planting in the field. Temperatures for cucumbers should be rather higher than is necessary for a number of similarly-treated subjects. The soil should not be allowed to dry out, but over-watering should be avoided, and if planting out is to be done immediately after the date of the last killing frost, the plants should be hardened off by gradual exposure to the cooler conditions of the open air a few days before being planted out.

Good results can be obtained in the open by taking out about a cubic foot of soil in a warm, sunny, sheltered part of the garden and filling the hole with fermenting manure to within about 3 or 4in. of the ground surface; the final 3 to 4in. should be filled with soil in which (or preferably at the sides of which) several seeds or plants are set. More seeds than the number of plants required are usually sown to provide against poor germination. To facilitate watering, the ground surface should be level when sowing is complete. Seed should be sown ½ to 1in. deep according to whether the soil is dry and light or sandy or wet and heavy. Plants can be spaced 18in. apart in rows 4ft. apart, but if the "hill" system is used and growing conditions are favourable, spacing of the "hills" should be more liberal, though three or four plants can be grouped around the edge of each.

Varieties: Early Fortune, Crystal Apple, White Spine, and Stockwood Ridge.

Kumara or Sweet Potato

The kumara or sweet potato is usually propagated by rooted shoots or slips, which can be purchased from seedsmen usually from about mid-October onward in areas suited to its culture. Alternatively plants for setting out when danger of frost is past can be obtained by starting tubers in August in a sunny position on a hotbed made from fermenting material such as stable manure which has been prepared so that it ferments uniformly. The heap should be levelled about 18in. high and can be made up in a frame or roughly squared and a temporary frame built over it. The hotbed should be covered with about an inch of sand or soil, on which the tubers should be placed close together (but not touching) and covered with 2 to 3in. of soil. The soil need not be rich, but should preferably be sandy. An additional inch or two of soil spread over the bed when the shoots appear will ensure sturdy, well-rooted plants. If the frame is not covered with a sash, protection should be given and the heat retained by placing sacking and corrugated iron or wood over it. The covering must be removed as soon as shoots appear on the surface, though protection should be given against frost. Soil temperature should be constant at 65 to 75 degrees F., and watering regulated to give a stocky plant not easily broken. About six to eight weeks are required to produce plants for setting out, and during later growth barely enough water should be given to ensure proper hardening of the plants. Shoots part readily and should be pulled carefully when 6 to 8in. long, the parent root being held in one hand. Additional pullings can be made at intervals if required.

The soil for sweet potatoes should be of a type that warms readily, and light or sandy loams are usually preferred. Organic manure applied to a previous crop gives most satisfactory results and in most soils it should be supplemented with a dressing of bone meal or superphosphate, as trials indicate that phosphoric acid requirements are high, though the potash requirement seems to be more dependent on soil type. Very little nitrogen is required and an excess causes too much top growth at the expense of tubers. The roots are very sensitive to injury, and fertiliser should be well worked along the row a week or two before planting.

Planting can be done on the flat, but in districts in New Zealand where there is no danger of soil drying out it is usually done on broad, low ridges which warm quickly and facilitate digging. Care should be taken that the roots do not dry out between lifting and planting and if necessary they should be "puddled" in thick muddy water. In the home garden they should be set 16in. apart on the flattened tops of low ridges 24in. apart. The plants should be set about the same depth as they grew in the propagating bed, and it is considered that if the rooted portion of each plant is bent up like the bottom end of a J, tuber development will be better. Plants should be watered when set out if conditions are dry. Apart from weed control and the repair of broken ridges, cultivation is unnecessary, though vines are usually lifted occasionally to prevent their rooting, as such rooting appears to favour leaf rather than tuber development.

Though kumaras can in some seasons be grown in a few warm, sheltered areas as far south as Christchurch, their culture commercially is confined to northern parts of New Zealand. They are classed as a tender to very tender crop, and though they can be dug in the home garden where conditions are favourable about 3½ months after planting, results are usually better if they are left. They gain rapidly in total yield as they near maturity and the table quality of mature tubers is better than that of immature ones. They can be dug when the skins are reasonably firm or can be tested by cutting. When they are cut mature tubers dry rapidly on exposure to the air.

Lettuce

Lettuce thrive in cool, fertile, well-drained soils, and if suitable varieties are chosen, it is possible in most home gardens to harvest them throughout the year. Plant breeders have produced varieties that have shown remarkable adaptation to hot, dry conditions and this is a particularly-favourable development, as it is in the warmer weather that lettuce is so popular as a salad vegetable. Lettuce is an excellent source of vitamins B_1 and B_2 as well as calcium and iron and it contains some vitamin C; because it is eaten raw, it loses none of its food value during preparation for the table.

The soil should be rich in organic matter, and as the seed is small and germination relatively weak, cultivation should be thorough. Fairly-heavy applications of organic manure are advisable on most soils, but very rapid growth as the result of too much nitrogenous manure may cause tipburn (dying back of leaf edges). It is essential that the soil retains its moisture well, but drainage must be good and on areas that are inclined to be wet lettuce should be grown on a raised bed. Fertiliser recommendations vary greatly according to soil types and conditions, but on soils where insufficient rich organic manure is available a fertiliser containing nitrogen, phosphoric acid, and potash is recommended, and as the plants should be kept growing steadily, side dressings of nitrogenous fertilisers such as sulphate of ammonia, nitrate of soda, or dried blood may be advisable.

Hearting lettuce is difficult to grow in winter where the ground is very cold, but early crops can be grown by sowing the seed in a box in a frame or cool glasshouse and transplanting the properly-hardened-off plants to the field when soil conditions improve. Properly-hardened, autumn-grown plants that are nearly mature will stand several degrees of frost and can be used late into the winter. Transplants are usually taken from early sowings, but later when conditions become hot and dry it is often better to sow thinly ¼in. deep in rows 12in. apart and thin the plants to 8 to 12in. apart in the rows. Recommended varieties for sowing in October are: Imperial (summer), Neapolitan (Webbs or New York), and Success. Cos: Paris White.

Onions

In most South Island districts it is usual to sow main-crop onions in September. If this has not yet been done, a sowing should be made without delay, as advised in last month's "Journal." Established crops should be kept cultivated and weed-free.

Parsnips

In southern districts October is the preferred month for sowing parsnips, though sowing can be delayed until November or December or even later in districts which experience a long season of growth. Parsnips are a good source of vitamins B_1 and C. They are high yielding and when well established in moderately-rich, well-drained soil they require little attention. Probably their greatest value lies in their use as a winter vegetable, as they "stand" well, and provided the soil is well drained, they rarely suffer harm, even if left in the ground in the severest winters. They are very sensitive to soil acidity and in most gardens the ground where they are to be sown should be dressed with lime at the rate of at least 3 to 4oz. to the square yard if a dressing has not been applied within the last year; in high-rainfall areas the rate should be increased considerably.

Like most other succulent, tap-rooted vegetables, parsnips should be kept growing steadily for quality and yield, and a deep, friable, well-drained, deeply-cultivated soil that is well supplied with humus is best. Parsnips do best in soil in which organic manure has been applied to the preceding crop, though satisfactory results can be obtained if manure is applied in moderation and is well rotted and thoroughly incorporated in the soil before sowing. Where organic manure is not available compost or a green crop should be dug in and supplemented with a fertiliser containing nitrogen, phosphoric acid, and potash. Local experience must determine the actual ratio, but on most soils a mixture that is highest in phosphoric acid and relatively low in nitrogen is likely to be most suitable. To obtain long, straight roots the ground, unless it is of a very loose, open nature, must be dug to a depth of 2ft. or more. This entails too much work for the average home gardener and the method sometimes adopted is to make holes with a crowbar 9 to 12in. apart and fill them with fine, suitably-prepared soil (potting soil is suitable). After the soil is firmed four or five seeds are sown in each hole, as germination of parsnip seed is usually poor. Only the strongest is left after germination.

Peas

Successional sowings of peas should be continued as advised in last month's "Journal." There are some very fine varieties available. The dwarf varieties such as W. F. Massey and Greenfeast are most popular, but tall varieties usually give a greater yield over a longer period and where shelter and facilities for giving support are available they are well worth the extra work involved. Alderman, the culture of which was described by S. O. Gillard in the August, 1947, issue of the "Journal," is one of the best tall varieties. Sugar or edible-podded peas are also worth a trial in gardens having the space.

Potatoes

Because they are a staple article of diet, potatoes are the most generally planted of vegetable crops in New Zealand. They are grown in practically every home garden; even where space is at a premium it is usually profitable to grow at least one row of early potatoes. Many home gardeners who have the space have tried growing a considerable area and have been discouraged by their comparative lack of success and as a result now plant potatoes in a perfunctory way. The potato crop is, however, so important that the selection of varieties and their planting and cultivation deserve a good deal of attention.

One of the most important points in growing potatoes is the use of Government Certified seed. Few vegetables are subject to as many diseases as the potato and many of the diseases do not show in the tubers except to the expert. Tubers infected with virus diseases such as leaf roll, mosaic, and crinkle may appear healthy and of a desirable type, yet if it were not for the seed certification scheme, these diseases would reduce the total yield of potatoes in New Zealand by half or perhaps two-thirds. Virus diseases are transmitted mainly by aphides (greenfly), the lower incidence of which in the South Island is the main reason for the growing of most of the Certified seed there.

Apart from the purchase of Certified seed, the important points in potato growing are choice of variety, soil condition, and cultivation. Though the home gardener can usually make his soil more fertile by such means as drainage, rotation of crops, the addition of humus or humus-forming materials, and the judicious application of fertilisers, he cannot change his soil type, and though he may be able to provide shelter, he cannot change the aspect of his garden. Thus if his garden soil is a heavy clay loam and has a southerly aspect, he may be able to mitigate its worst features, but can rarely do more. He should therefore select varieties most suited to his conditions. If he has space, he should try several of the most suitable for two or three years; a one-year trial is rarely of much value, as conditions may be exceptional. Soil preparation and potato planting were described in last month's "Journal."

Spinach

Of recent years the health-giving value of spinach has been greatly publicised, and though expert opinion has not always been unanimous because of some doubt as to the availability of certain of its constituents, it is generally conceded to rate very highly as a health-giving vegetable. It is quick growing, maturing in from 40 to 55 days. It is hardy when established under cool conditions, and though it does not germinate and grow well in hot weather, it thrives on a great range of fertile, well-cultivated, and drained soils. It is not tolerant of soil acidity, and lime should be applied if necessary. There are two kinds of spinach, the seed of which, but not the top growth, differs. The round-seeded kind is used overseas for summer sowing, but is less favoured in New Zealand. The prickly-seeded type does not go to seed so readily and is classed overseas as a winter spinach. There are smooth-leaved and savoy or crinkly-leaved varieties in both the smooth-seeded and prickly-seeded kinds. The virus disease mosaic sometimes causes reduction in yield, and resistant varieties such as the prickly-seeded Presto Blight Resistant and the shorter-standing Japanese Prickly and round-seeded varieties such as Virginia Savoy and Old Dominion have been developed.

Seed should be sown thinly ½ to 1in. deep in rows 12in. apart. Plants can be thinned to four or five to 1ft. of row, though if sown thinly, thinning in the accepted sense is not essential; it can be confined to the removal of the young plants when large enough for use.

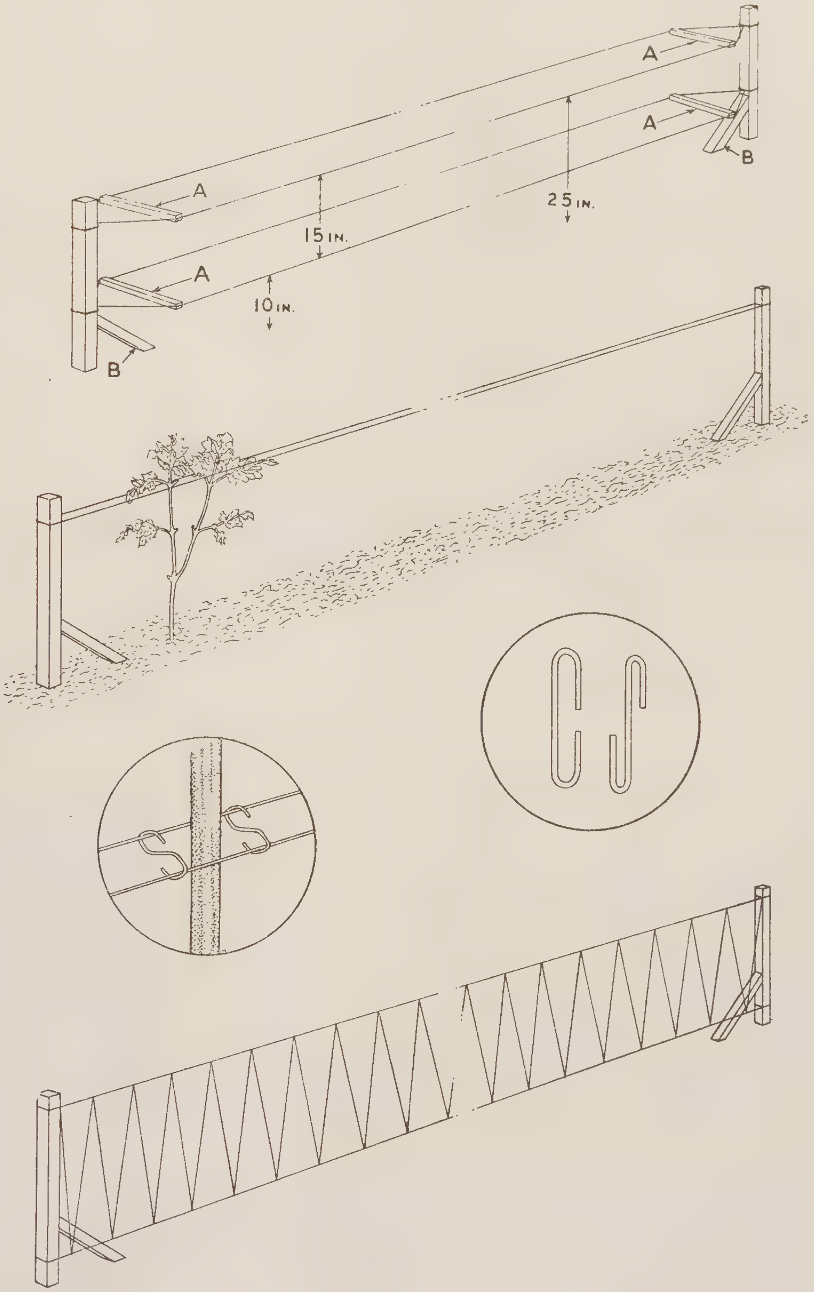
A good dressing of organic material such as well-rotted farmyard manure or compost is advisable on most garden soils. As spinach is a leafy vegetable, extra applications of nitrogen may be necessary on some soils and can be supplied by liquid manure or a side dressing of nitrate of soda or sulphate of ammonia raked in along the line of row, but it should not touch the foliage. Liquid manure is preferable where conditions are inclined to be dry.

Sweet Corn or Sugar Maize

There is much confusion among home gardeners about the difference between sweet corn (*Zea mays*) and other types of maize grown chiefly for stock food. The important difference lies in the make-up of the grain. The tissue enclosed with the embryo in the seed-coat of sweet corn contains a higher percentage of sugars and a correspondingly-lower percentage of starch than other types of maize. Furthermore, when dry the grains of sweet corn become wrinkled, but the seed-coat of the more starchy maize remains smooth and fully rounded.

Sweet corn is a member of the grass family, which is the greatest of all food-bearing plant families. It is an annual and bears separate male and female flowers. The tassel is the male inflorescence; the ear is the female. Recognition is important, as pollination normally takes place as soon as the silks appear and development of the corn should be rapid thereafter; the edible stage is usually reached two to four weeks later according to temperature, usually when the tassel has just withered. Maturity is commonly tested by thumbnail pressure. The young grains are first watery inside, then milky, then doughy, and, finally, the "dent" stage is reached when the grains are too hard to be palatable.

METHODS OF STAKING TOMATO PLANTS



In addition to being staked individually, tomato plants can be supported by the methods shown above. Upper—Cradle method, which is suitable only for unpruned plants and is rarely used. A—Wooden crossarm. B—Support for end post. Middle—Double-wire method, which is suited to small plants grown with two leaders; taller or single-stem plants can be supported by using higher posts and several double wires. Inset left—"S" hooks can be used to hold the stems of tomato plants supported by the double-wire method. Inset right—Other handy types of hooks which can be made easily for use with double-wire supports. Lower—Trellis framework made of two horizontal wires laced with binder twine.

THE HOME GARDEN IN OCTOBER

[*Green and Hahn Ltd. photo.*

The yam or oka plant, which is cultivated for the tubers, grows well in warm situations in well-drained, rich soils, preferably light.

The cob should be harvested with a gentle jerk or cut with a sharp knife when the milky contents of the grain are beginning to thicken but are still milky.

Sweet corn can be grown on a wide variety of soils, and though crops can be grown on soil of only moderate fertility, the best results are obtained on warm, well-manured, medium or light loams. Organic material such as farmyard or stable manure is advisable on most home garden soils. Phosphoric acid (which can be supplied in the form of superphosphate) is the only additional fertiliser advised on a majority of soils where trials have been carried out.

In hardiness sweet corn compares with the tomato and french bean and can be sown outside about the same time as the french bean or the New Zealand spinach. Sweet corn can be grown in rows, but if grown in "hills" or clumps, pollination is usually assisted. Seed should be sown 1 to 2in. deep; if planted in rows, the plants should be 12in. apart and the rows 36in. apart. Clumps should be 36in. apart, and though it is usually advisable to sow about seven or eight seeds at each to allow for failures, only four or five of the strongest plants should be left after they reach about 2in. high. The number of seeds an ounce varies from about 100 to 230 according to variety.

Suckers often develop, but there is no evidence that their removal promotes earliness or increases the number or weight of the ears on the stem. When the plants are 3 or 4ft. high it is usually advisable to earth them up the stems to a height of 6 to 8in., as this benefits the roots and helps to support them against wind. In exposed positions staking may also be necessary. A warm, sunny, sheltered position is preferable in most gardens, and in soils rich in organic matter watering should not be necessary unless conditions are exceptionally dry. In most southern districts the crop is likely to be disappointing in cold, wet seasons.

The choice of a variety suited to local conditions is very important and much work has been done overseas on the production of varieties suited to specific conditions. Popular varieties in New Zealand are Country Gentleman, Golden Bantam, Golden Cross Bantam, and Stowells Evergreen.

Tomatoes

Except in a few favoured areas, tomatoes cannot be planted in the open in Canterbury and southern districts until about the second week in November without incurring risk of frost, but in northern and central districts they can be planted out toward the end of October. Soil preparation should begin early. A deeply-dug, well-drained soil rich in humus, and a warm, sheltered situation having the maximum amount of sunshine are best. Plants for setting out should be sturdy, erect, 6 to 8in. high, and free from disease. The foliage should be an unblemished dark green and the base of the stems a dark purple which as it extends upward gradually merges with the natural green of the plant.

It is advisable to obtain plants from a grower who uses sterilised soil, who takes other precautions against disease, and who does not crowd individual plants together in the boxes so that they are thin and weak. Diseased plants will be an endless source of worry to the grower and are usually best destroyed. Similarly plants that have weak rooting systems or are thin and starved will suffer a severe check, particularly if the weather is unfavourable when planted out, and valuable time will be lost in their recovery.

Plants should be hardened off by gradually-increased exposure to conditions similar to those in which they will finally be planted out. Hardening off should be done at home if the plants bought are tender and the weather uncertain.

Unless dwarf varieties are to be grown, provision must be made for supporting the plants. They can be staked individually or tied to wires supported by end posts; occasionally they are grown on two stems or even left unpruned. The principal methods of supporting tomatoes are shown on the preceding page.

Acid or heavy soils usually benefit from the application of lime, preferably in the previous autumn. It should be applied at the rate of 3 to 4oz. a square yard, but on certain soils and particularly in high-rainfall areas it can be applied at twice or three times this rate. Because the application of large quantities of lime to certain soils may result in the "locking up" of certain minerals such as iron and manganese and may therefore cause deficiency diseases, it is preferable to apply moderate dressings at relatively-short intervals rather than very heavy dressings at long intervals.

Well-rotted organic material such as farmyard manure or compost is recommended for most garden soils, but it should be thoroughly mixed with the soil a considerable time before planting. Where additional fertilisation is necessary a balanced dressing of artificial manure can be applied.

Dwarf plants should be set not less than 2ft. apart in the rows; other types should be 12 to 15in. apart. The rows should be 36 to 48in. apart.

Good varieties are:—

Unpruned: Tatura Dwarf, Early Dwarf Red, Marglobe, and Holmes Open Air.

Others: Kondine, Best of All, and Sunrise.

Yellow varieties: Golden Nugget, Golden Queen, and Mingold. These are preferred by many because they are less acid than the red.

Yam or Oka Plant

The true yam is a tropical plant with an edible root and belongs to the genus dioscorea. Though commonly called a yam, the oka plant (*Oxalis crenata*) belongs to the same family as the shamrock, the foliage of which is somewhat similar. It is grown for the tubers, which are long and ovoid and are marked with numerous regular hollows. They have a smooth skin which may be yellow, white, or red. The end which joins the stem is usually slightly narrowed. The plant grows well in warm situations in well-drained, rich soils, preferably light. It is a perennial, but as it is frost tender, it is usually grown after the manner of potatoes. It is propagated by sets like the potato, but can be grown from cuttings, which are easily rooted.

The sets should be planted 3in. deep and 18in. apart in rows 2ft. apart as early as possible, but the time of planting should be arranged so that there will be no danger of frost damage to the foliage. In districts where the plant grows particularly well spacing should be more liberal. The tubers are produced in great abundance, but are rarely thicker than a hen's egg; they do not swell much until rather late in the season, and in most districts it is not customary to gather them until frost has cut down the foliage. The plant is rather sensitive to cold and has a spreading habit. As the stems lengthen they should be covered to within 6 to 8in. of the tops with light soil or compost, as this assists the development of new tubers.

The tubers of some strains have a somewhat acid taste when first dug, but quickly lose all acidity on exposure to the sun. If exposed to a hot sun for several months, they become wrinkled and acquire a flavour which to some extent resembles that of dried figs.

POTATOES AND WHEAT THE MAJOR CASH CROPS

By C. C. LEITCH,
Assistant Fields Superintendent, Christchurch.

IN the early development of that rich belt of farming land in South Canterbury, the narrow strip of alluvial coastal plain between the Waitaki River in the south and the Pareora River in the north, it was found that the flatter, more fertile areas near Studholme and Willowbridge were eminently suited to potato production. The results obtained then established the local farming practice, which is still carried out, of growing potatoes and wheat as the major cash crops. In this article farming practices on a typical property in the district, that of Messrs. F. R. and C. Rollinson, of Studholme, are discussed to exemplify this particular type of farming.

THE dependence on potatoes and wheat as the two principal crops has been amply justified by the returns obtained. The area of the district planted annually in potatoes varies from 1500 acres to 2500 acres, and with its high average per acre yield of 6 to 8 tons of table potatoes the district is responsible for a considerable proportion of the potatoes required for local consumption and shipment to North Island ports.

The soil type of Messrs. Rollinson's property would enable a wide range of crops to be grown successfully, but as both climate and soil are suitable for the growing of potatoes, which is not the hazardous undertaking it is in other parts of the country, potatoes have assumed the role of one of the major cash crops, round which the economy of the whole farm revolves. Wheat, oats, and peas figure in the rotation, but all are subsidiary to the potato crop.

The property of 250 acres is situated seven miles from the township of Waimate and two miles from the railway at Studholme Junction. The farm buildings comprise an implement shed, cow shed, and granary with lean-to for further implements and storing of potatoes. The fences are mainly of well-trimmed gorse, only more recent subdivisions being of wire and posts and droppers.

Arran Chief, which produces plenty of top growth and smothers weeds, is now recognised as the most suitable and reliable potato variety for the district. The average yield on the farm described is 12 to 14 tons per acre.

Dreadnought, a high-yielding wheat with plenty of straw, is the variety favoured. The straw is used to cover potatoes after they are dug. Average yields of wheat on the farm are 60 to 65 bushels per acre.

Stock

The stock consists of sheep, a few cows, and one draught horse for odd jobs. Three hundred breeding ewes (Romneys) and 150 dry sheep are wintered, and 4 cows are milked for the household. It is the practice to make replacements by purchasing 130 Romney ewe hoggets annually, 100 of which go into the breeding flock and the balance are sold as two-tooths. An average of 100 full-mouth ewes is sold annually. The lambing percentage has not been lower than 125 and has been as high as 140. The endeavour is to sell as many lambs off the mothers as possible and the balance are fattened on rape and grass. An average of 50 per cent. of lambs go away fat off the mothers. Provision for wintering of sheep is made by growing chou moellier, swedes, hay, and grass.

Implements

Implements, comprising the usual range required for a mixed farm, consist of two wheel-type tractors, one a row-crop and the other a general-purpose type, a 3-furrow plough, a drill, a cultivator, tine and grub harrows, a 2-row potato planter, a power-driven potato digger, a power binder, a trailer-type tractor mower with 5ft. bar, a 2-ton truck, a hay sweep, a roller, and a colonial drill converted to a broadcaster.

Rotation

The rotation generally followed is to plough up 3- to 4-year-old grass, then to crop with potatoes, wheat, and oats, and then to sow back into grass. Sometimes an area is sown to grass at the same time as the oats are sown, but in recent years an endeavour has been made to sow paddocks down on a summer fallow. In some years it has been found necessary to have a rotation of grass, potatoes, wheat, potatoes, oats, rape, and sown down to grass with the rape. This rotation is followed on paddocks

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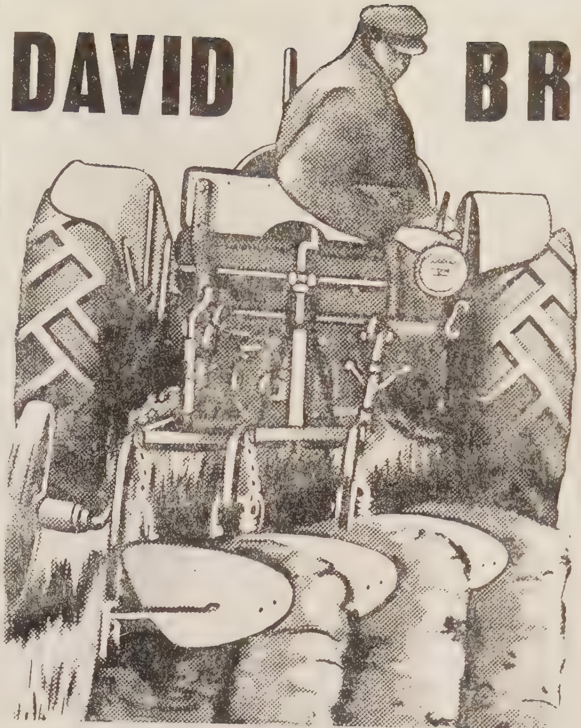

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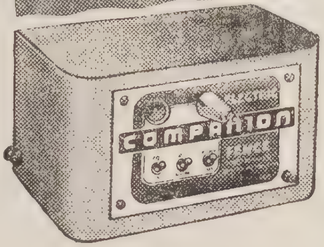

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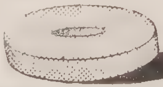

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that have been in grass for a few seasons and on which the fertility is high, the object being to endeavour to have a constant area of potatoes and wheat to keep the cash returns at an even figure. The oats are grown for milling and chaff and the chou moellier, rape, and swedes for fattening and winter feed.

The wheat is always autumn sown unless weather conditions prevent it. The variety that has been found most suitable is Dreadnought, which is a high-yielding wheat with plenty of straw, the straw being used for covering the potatoes after digging. The average yield of wheat is 60 to 65 bushels per acre.

Oats, either Gartons Abundance or Gartons Onward, are generally sown in July or August. The average yield is 75 to 80 bushels per acre. In some seasons, if weather conditions have upset the programme, peas and barley are grown, but they do not generally figure in the rotation.

Broad Leaf Essex rape for fattening the lambs is generally sown on the flat from the beginning of November. Sometimes grass is sown with the rape. If there is a surplus of rape, it is generally sold as grazing, and it is very rarely that lambs are purchased for fattening.

Chou moellier and swedes mixed are sown on ridges from the middle of November till as late as December in unfavourable seasons.

Gartons Abundance or Gartons Onward oats are usually grown for threshing. They are sown in July or August and yields average from 75 to 80 bushels per acre.

Grass

Grass is sometimes sown down with crops, but in recent years it has been found more profitable to sow on a fallow. The seed is generally broadcast about January or February, the mixture being 25lb. of Certified perennial ryegrass (either Pedigree or Mother seed), 3 to 4lb. of Certified Mother white clover seed, and 1 to 2lb. of crested dogstail; some consideration is now being given to including timothy in the mixture.

Sometimes the first crop is taken for grass seed, but only if this fits in with the feed position, the ewe and lamb being the first consideration. Grass has not as yet assumed a major role as a cash crop. In suitable seasons some areas are saved for white clover seed, but again the needs of the ewe and lamb come first.

Montgomery red clover is sown also in a mixture with perennial ryegrass and sometimes white clover, but generally just perennial ryegrass. This mixture is generally sown to pasture in the spring on the wheat or oat crop. This pasture mixture is used for hay, and if the feed position is good, the area is closed for seed. In some seasons it is grazed through the year.

Potatoes

Grassland is generally prepared for the potato crop, the area being grazed hard and skim ploughed in April or May, cultivated down, and deep ploughed about the end of June or the beginning of July. The land is then left in the furrow for the remainder of the winter. About the middle of August real cultivation for the crop begins, the hustler and drag harrow being used to get the land into the required condition; deep, thorough cultivation is the aim, with a thorough mixing of the turf.

Planting is generally done about the second or third week in October, sometimes on a rolled surface, but generally on the cultivation which has been reduced and consolidated by frequent harrowing. A mechanical two-row planter drawn by tractor is used, the depth aimed at being between 3 and 4in. with 15 to 16in. between the tubers. Superphosphate at the rate of 3 to 4cwt. per acre is applied in the same operation. It has been found that on the type of soil and after grass the 3 : 1 mixture of superphosphate and sulphate of ammonia is inclined to encourage rather too much soft growth, which renders the crop prone to injury by wind and blight.

About a week after planting, the crop may be inter-row cultivated with an adjustable grubber, the tines of which can be arranged to fit the rows and set to do the most efficient work. After the inter-row work has been done the rows are harrowed down, and the crop is then left until 30 to 40 per cent. of the potatoes are just through the ground, when they are again harrowed, sometimes across, but generally along, the rows, weed growth being the governing factor. After this the crop is inter-row worked at intervals until the tops are not quite meeting in the rows, when it is ready to

In seasons of surplus pasture growth hay and sometimes grass seed are saved.

mould with a grubber to which special mould-boards are attached. It is then left until the tops have died down, when in seasons of bad weed growth a few lambs are allowed to run on the area to keep weeds in check.

The crop is dug by a tractor-drawn, power-driven mechanical digger. In a normal season the crop is ripe for digging about the end of March and the beginning of April. Pickers are employed and table, seed, and small potatoes are all picked up together. The sacks are either carted into the shed or stacked in a convenient spot on high ground. The crop is very seldom pitted; it has been found more convenient to stack the bags in heaps and cover well with plenty of straw so that they will withstand severe rains and frosts. The crop is then left until the wheat is sown, when a start is made on the grading, which is done by a mechanical grader so designed that various sizes can be graded in the one operation. The sizes are table, seed, and small and under grades. The crop is then ready for marketing.

Seed

After many trials with other varieties, the Arran Chief is now recognised as the most suitable and reliable. It produces plenty of top growth and smothers the weeds, and is capable of high yields. The average yield on this farm is 12 to 14 tons per acre.

Before the introduction of seed potato certification the seed position was very hazardous, and no reliance could be placed on the quality of seed obtainable from season to season. Growers have now adopted a scheme under which they purchase Certified Mother seed of the highest grade from southern growers of Certified seed. A sufficient quantity is purchased annually to ensure that the produce will plant out the whole of the area to be grown the next season. The practice of endeavouring not to plant seed that is more than twice removed from the seed obtained from southern sources has been found to be the most economical, as the yield is inclined to deteriorate rather rapidly after the second season. The produce from the twice-grown seed is sold along with any surplus of once-grown seed. In the case of the once-grown seed the 1 to 2oz. size is disposed of first. The seed is entered for certification each season, both as a check on disease and also to have Certified seed for sale.

About 300 breeding ewes and 150 dry sheep are wintered. Lambing percentages are never lower than 125 and a large proportion of the lambs are sold fat off their mothers.

Manuring

All crops and pastures are sown with fertiliser. Before the rationing of fertiliser an endeavour was made to topdress with at least 1cwt. of superphosphate per acre. This has not been possible with rationing in force, but the liming programme has been kept up, 1 ton per acre being topdressed on all newly-sown pasture. Sometimes it is applied during precultivation and worked into the ground at the final working, but generally the pasture is topdressed when it is well established.

Farm Programme and Yields

In an average year with a typical cropping programme income additional to that from sheep is derived from 20 acres of potatoes, 27 acres of wheat, 17 acres of oats, 8 acres of Montgomery red clover for seed, and 24 acres of rape and chou moellier for fattening lambs and wintering stock. It is the aim to endeavour to keep the cropping programme as near these figures as possible, so that income is fairly stable.

Average yields of potatoes, wheat, and oats, which are fairly typical of those in the Studholme, Willowbridge, and Morven districts, are: Potatoes, 14 tons per acre; wheat, 65 bushels per acre; oats, 80 bushels per acre.

The farm is fairly typical of a good many of this type in the district; some differ in that a greater acreage of potatoes is grown, but this is done by leasing land for any acreage in excess of the proportion indicated for the farm quoted.

Throughout the war growers did their part by increasing the area in potatoes, often at the expense of their land and the rotation, and it is possible that not only now but also in the future there will be a falling off in the area of both potatoes and wheat and an increase in the area of grass and clovers in an endeavour to replace some of the fertility lost by the heavy cropping programme during the war.

Acknowledgment

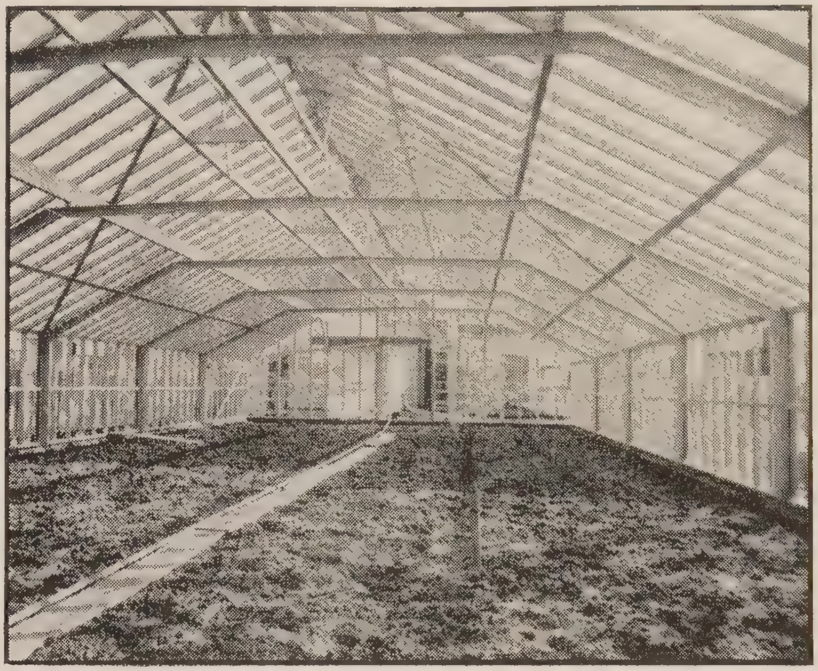
Acknowledgment is made to Messrs. F. R. and C. Rollinson for their assistance in supplying information for this article.

METEOROLOGICAL RECORDS FOR AUGUST

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum					Maximum fall		
				Maximum	Minimum	Total fall	No. of days of rain	Difference from normal	Amount	Date	
Waipapakauri	6	52.4	— 0.6	65.2	31.3	5.62	17	+ 0.66	0.89	21	
Auckland	160	52.2	+ 0.1	61.4	38.0	3.29	18	— 1.34	0.55	16	147.0
Tauranga	10	49.1	— 0.5	65.0	31.9	3.95	14	— 0.79	1.01	16	180.9
Ruakura	131	47.0	— 1.4	62.0	24.1	5.02	17	+ 1.01	1.07	26	135.8
Rotorua	980	46.5	+ 0.2	67.0	27.0	3.35	10	— 1.82	0.92	16	140.2
Gisborne	12	49.0	— 0.5	63.8	31.0	3.36	19	— 0.35	0.70	31	152.6
New Plymouth ..	160	49.6	0.0	58.8	34.8	6.78	17	+ 1.17	1.37	24	157.6
Napier	6	49.6	+ 0.7	65.9	31.0	1.44	9	— 1.55	0.55	15	154.6
Taihape	2157	43.0	+ 0.1	55.2	27.9	3.17	17	+ 0.46	1.18	7	
Wanganui	72	48.8	+ 0.3	60.7	34.2	2.02	13	— 0.75	0.45	18	150.6
Palmerston North ..	110	48.1	+ 0.5	60.0	30.0	2.47	14	— 0.88	0.70	7	156.1
Waingawa	350	46.4	+ 0.7	63.5	26.0	1.67	12	— 2.59	0.91	18	151.6
Wellington	415	48.3	+ 1.1	62.1	34.2	2.28	11	— 2.14	1.22	18	169.4
Nelson	24	47.2	+ 0.2	60.4	31.8	1.65	9	— 1.68	0.57	24	215.9
Blenheim	12	47.0	+ 0.1	63.7	29.5	0.76	9	— 1.53	0.30	24	208.0
Hokitika	12	45.6	+ 0.6	60.6	29.5	7.26	16	— 2.04	1.64	25	190.6
Hanmer Springs ..	1225	42.2	+ 0.8	63.3	19.0	1.64	8	— 1.84	0.50	1	154.4
Christchurch ..	22	45.4	+ 1.2	64.9	27.0	0.48	10	— 1.57	0.10	19	161.5
Ashburton	323	45.1	+ 2.0	66.0	26.4	0.94	6	— 1.29	0.41	6	169.3
Timaru	56	44.2	+ 0.4	60.4	27.0	0.84	6	— 0.55	0.46	17	163.8
Alexandra	520	43.0	+ 1.8	65.0	20.0	0.01	1	— 0.64	0.01	18	176.9
Taieri	80	43.8	+ 0.1	64.2	23.9	0.85	9	— 1.10	0.18	25	
Invercargill ..	32	45.8	+ 1.9	64.2	25.2	1.17	10	— 1.94	0.27	13	

Design for a Commercial Glasshouse Without Interior Posts

THE development of glasshouses in which interior supporting posts have been eliminated has been the outstanding feature of Nelson tomato houses during recent years. This obviously-desirable end has been achieved by various structural means in which steel has been used to give the necessary rigidity and strength. Of the three types of wood and steel houses to be seen in Nelson, two have disadvantages which class them as unsuitable for large commercial structures under present conditions. Though one of these designs is structurally sound, the cost of materials and erection is out of proportion to the benefits. The second, though less extravagant in the use of steel, might prove unsuitable for very long houses in exposed positions. The third, which has most of the features which would recommend if for general adoption, is described in this article by C. S. Richardson, Orchard Instructor, Nelson.



[*R. T. J. Blick photo.*

Portion of a steel-principal glasshouse 100ft. x 30ft. The feet of the principals are incorporated in the foundation walls, and web plates welded at the angles provide additional strength. There is no ground obstruction to interfere with steam sterilisation by the grid method.

CREDIT for the design goes to Mr. M. Monopoli, a Nelson tomato grower, whose early training as a shipwright is reflected in many details.

The basic principle is a simple steel arch or principal constructed from ½in. x 3½in. x 3½in. angle iron having a working stress of 16,000lb. to the square inch. A series of these principals, set in continuous concrete foundations, with wooden purlins form the skeleton around which is assembled the wall and roof members.

The details given apply to single-span houses with a maximum width of 30ft. With certain modifications, mainly the strengthening of the principals and the provision of two additional purlins, the design may be adapted to widths up to 38ft. It also lends itself to double- and triple-span units of the ridge and furrow type.

Foundations

The side walls are straight sided and 7in. thick, allowing for the complete incorporation of the lower portions of the principals in the foundations. The inside edge of the wall is bevelled to drain water away from the bottom plate. The end walls are 7in. thick at the base, straight on the inside but shaped on the outside face to finish 4in. wide at the top. Bolts are inserted in the concrete at 4ft. intervals, those on the ends being not less than 1ft. from the corners. Damp-coursing of sand, cement, and bitumen is laid along the top before the bottom plate is put in position.

The Principals

Because of a shortage of ½in. x 3½in. x 3½in. angle steel, in some instances 3in. steam tubing has been used as a substitute, though this is not recommended because of the lack of flat bearing surfaces where the woodwork comes in contact with the iron.

The principals are made to templates conforming to the height of walls and angle of roof. The legs or vertical members are constructed to fit against the wall studs, to which each is affixed by two bolts after a strip of tarred roofing material has been inserted between the two. The principal continues parallel to and 1in. below the rafters, the space thus formed preventing water lying between wood and metal. After following the rafter angle for about 6ft., according to width and pitch, the arch becomes more nearly horizontal. The centre of the arch immediately below the ridge has a rise of 6in. from the horizontal to prevent the member sagging. Web plates of ½in. steel are welded at all angles to give additional strength.

The principals are usually built in two sections, though it is possible to erect them as units. After being erected on the job the two sides are brought together and welded at a point immediately below the ridge. Angle iron brackets are welded to the top flange of the principal and drilled to take the 8in. x 2in. purlins.

The feet of the principals rest on concrete blocks which descend 1ft. below the normal foundation footing. Also counteracting any tendency of the principals to sink under the weight of the structure is a steel rod which passes through the angle iron parallel to and about 7in. below the top of the concrete foundation wall. This also makes for lateral stability and minimises the possibility of the stanchions being wrenched from the foundations.

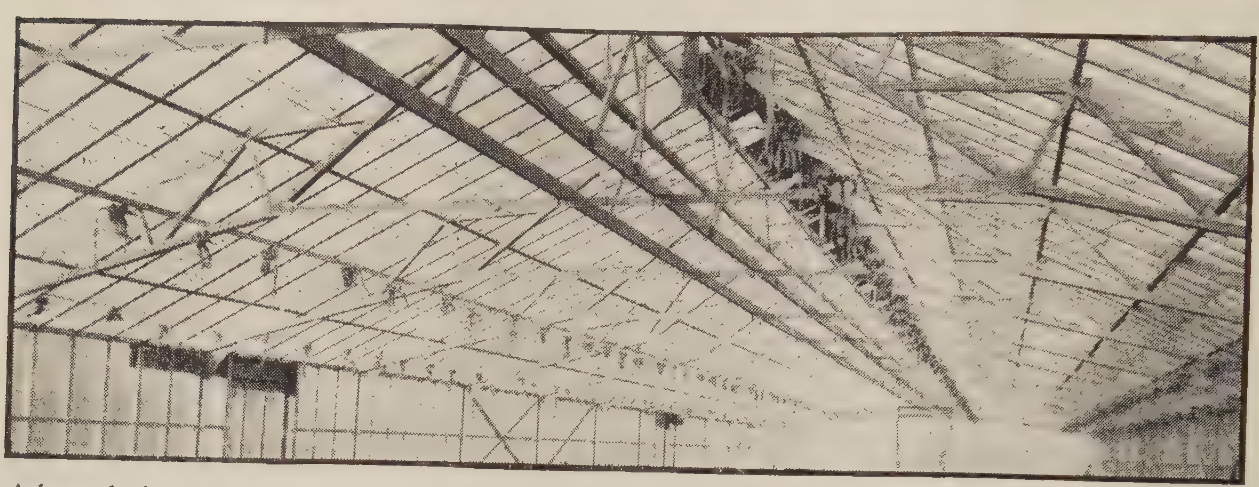
When the principal is erected and the rafters are in position a ½in. king bolt is passed through the ridge board and bolted to the principal immediately below. This completes the truss, which is then capable of withstanding any load or stress which the structure may have to carry.

Principals are spaced at about 11ft. intervals according to the width of glass used. They are not necessary on the end walls, so a 100ft. house requires eight principals.

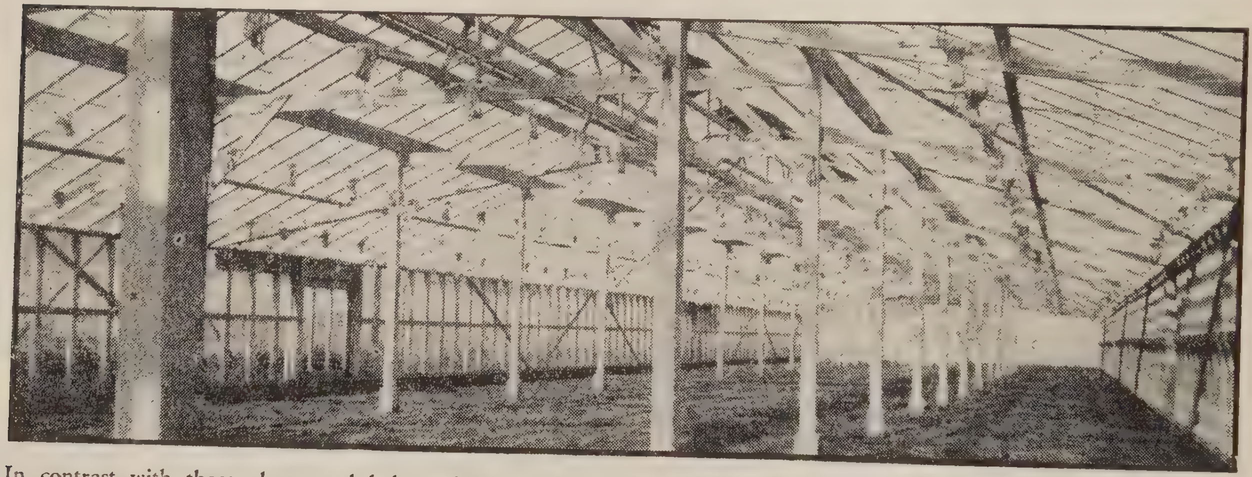
Purlins

Two purlins or main bearers support the rafters in the 30ft. house. They are bevelled to the roof angle and so placed that they intersect the rafters halfway along their length. For trueness and durability 8in. x 2in.

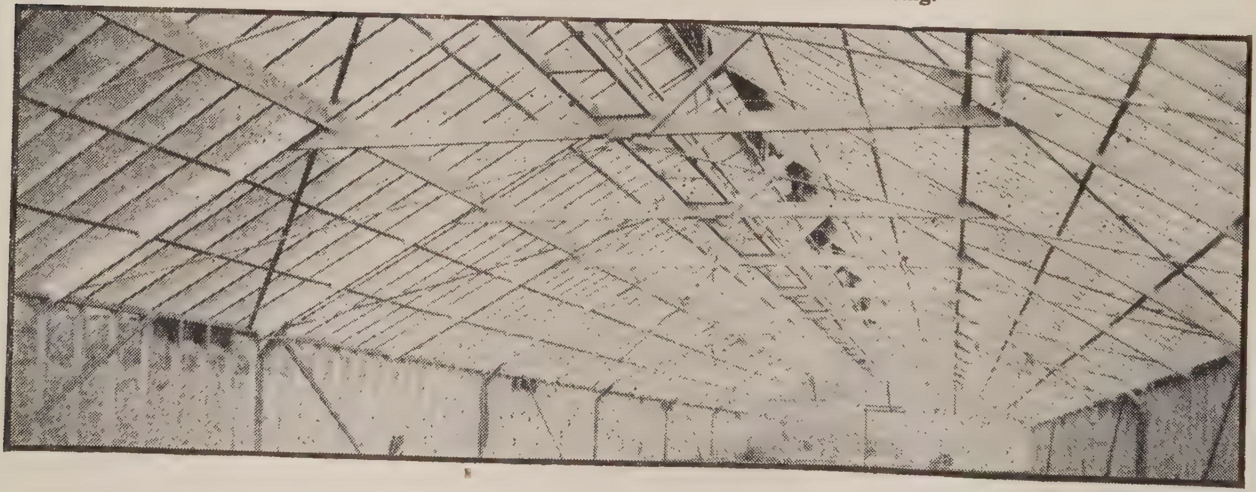
THREE TYPES OF COMMERCIAL GLASSHOUSE CONSTRUCTION



A large glasshouse which was built with a complete all-steel truss. The purlins are also of angle steel, with rafters and studs of wood.

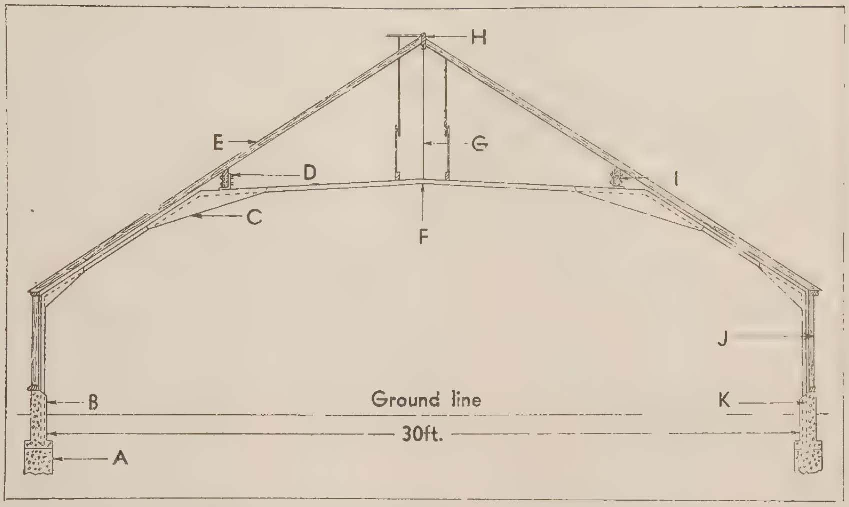


In contrast with those above and below, this view of a purlin post-supported glasshouse shows the amount of ground obstruction and the shadows caused by overhead bracing.



[*Photographs by R. T. J. Blick.*

A glasshouse 185ft. x 35ft. built on the tie-rod principle. A steel rod from the ridge passes through the collar tie and is linked to two lateral rods which pass through the top wall plate. Roof pitch is increased in this type to avoid the likelihood of the structure spreading.

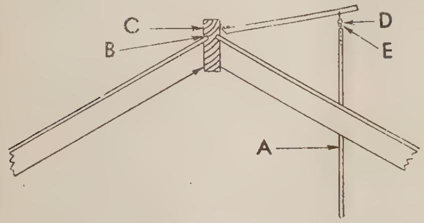


Cross-section showing the positions of the steel principals and how they are fixed into the concrete walls. A—12in. x 12in. concrete blocks. B—7in. concrete wall. C—½in. steel web plate. D—angle iron bracket. E—3in. x 2in. rafter. F—3½in. x 3½in. x ½in. angle iron principal. G—½in. king bolt. H—7in. x 2in. ridge board. I—8in. x 2in. purlin. J—3in. x 3in. stud bolted to principal. K—⅝in. steel rod.

Oregon pine is desirable. They should be about 22ft. long so that they pass over one principal and are joined with an oblique scarf on the next. They are bolted to the angle brackets after being insulated from the ironwork by strips of tarred roofing material.

Studs and Rafters

The side wall studs are 3in. x 2in. timber rebated ½in. x ⅝in. to take the glass. Corner studs are 3in. x 3in., as are the studs which abut the vertical members of the principal. The heavier stud allows for the insertion of the bolts which tie them to the steel. Because of the extra length and the strain, the end wall studs are 4in. x 2in.



Details of ridge and vent. A—Vent rod. B—Groove for glass. C—Ridge. D—Screw eye. E—8 gauge wire to form loop.

Rafters are 3in. x 2in., rebated in the same way as the studs. The four end rafters are 3in. x 3in.

Top and Bottom Plates

The bottom plate is 5in. x 2in. with a ⅝in. glass rebate and bevelled to fall away from the glass on both inside and outside surfaces. The studs are splayed to sit neatly on the bevelled plate.

The top plate is 4in. x 2in. with a bevel of ½in. from the inside to the outside to allow water which may accumulate on the upper surface to run off.

Roof, Wall, and End Bracing

The ridge board is 7in. x 2in. perferably Oregon pine. A bevelled groove takes the glass.

The roof is V braced with 3in. x 1in. battens running from the ridge to the top wall plate and nailed where they intersect the rafters. Alignment battens, also 3in. x 1in., run parallel to and on either side of the purlins.

Side and end walls are similarly braced. The side walls each have an alignment batten 2in. x 1in. midway between top and bottom wall plates. This batten is bevelled on the upper edge to run moisture away from the studs.

Nails and Bolts

Two and a half inch galvanised nails are used throughout except those fastening the 3in. x 3in. studs, where 3in. nails are necessary. All timber should be drilled to take the nails.

All bolts are dipped in warm bitumen before they are placed in position. Those fixing iron to woodwork are countersunk ½in. into the wood; the recesses thus formed are coated with red lead and oil after the bolts have been fixed and tightened and are later filled with red lead putty flush with the surrounding woodwork. Projecting portions of bolts are cut off level with the nuts.

DIMENSIONS OF TIMBERS

Unless otherwise specified, all timber should be heart rimu, dressed all round.

Side wall studs ..	3in. x 2in. rebated ½in. x ⅝in.
End wall studs ..	4in. x 2in. rebated ½in. x ⅝in.
Corner studs and studs abutting stanchions	3in. x 3in. rebated ½in. x ⅝in.
Rafters	3in. x 2in.
Top plates	4in. x 2in. splayed ½in. to give fall outward
Bottom plates ..	5in. x 2in. rebated ⅝in. and bevelled either side to give fall from glass
Battens under rafters	3in. x 1in.
Braces	3in. x 1in.
Horizontal battens—	
Along end walls ..	3in. x 1in.
Along side walls ..	2in. x 1in. bevelled on top edge
Ridge board (Oregon)	7in. x 2in. bevel grooved to take glass
Purlins (Oregon) ..	8in. x 2in.
Materials for vent openers (Oregon)—	
Bottom runners ..	4in. x 1½in.
Middle runners ..	3in. x ⅝in.
Lever arms ..	3in. x ⅝in.
End lever arms ..	3in. x 1in.
Vents	3in. x 1in.

Ventilation

Ridge vents are placed alternately along the entire length of the house. They consist of a frame of 3in. x 1in. timber covered with flat iron and normally occupy the space taken by four sheets of glass. Wall vents and swinging sashes above the doors are not fitted as standard equipment, as tomato growers are not unanimous about the necessity of these fittings.

A simple, all-wood, lever-action ventilator mechanism has proved both efficient and easy of operation. It consists of two 4in. x 1½in. Oregon runners the full length of the house, spaced about 2ft. apart and bolted to the steel principals immediately below the ridge. Two lever arms 3in. x ⅝in. are provided for each vent, their combined length being equal to the distance between the runner and the ventilator when the ventilator is fully open. One of these is bolted to the runner, and the other attached to the ventilator by a screw eye or butt fitting. The two unattached ends are then united with a bolt, which also passes through the 3in. x ⅝in. batten running parallel to the bottom runner. Each middle runner connects all lever arms

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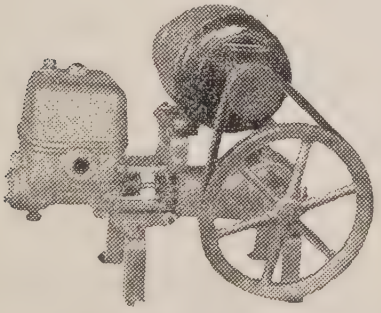

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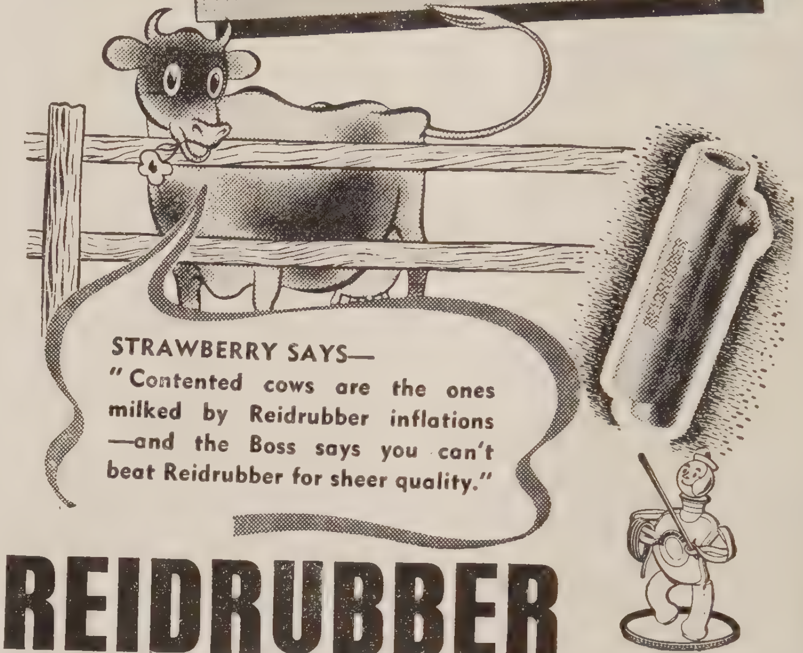

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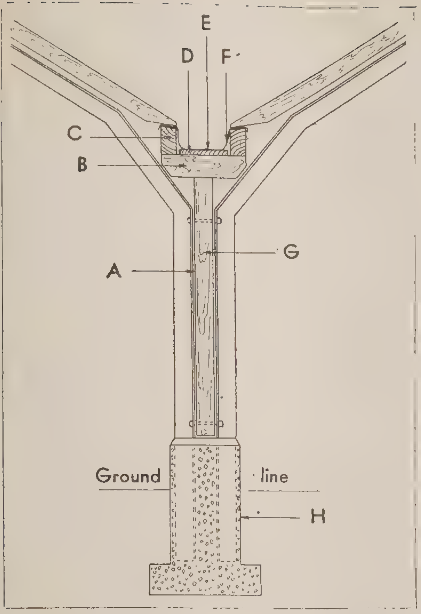
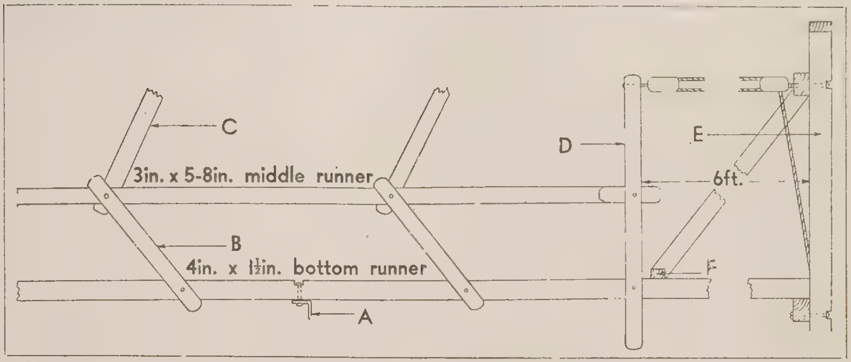


Details of guttering and support for a double span. A—Strip of tarred roofing material. B—4in. x 4in. bearer. C—6in. x 3in. plate. D—9in. x 1in. deck board. E—Hessian and bitumen. F—Flat iron. G—4in. x 4in. post. H—12in. x 12in. concrete block.



Details of vent openers. A—Horizontal member of principal. B—3in. x ⅝in. lever arm. C—3in. x ⅝in. vent rod. D—End lever arm (two 3in. x 1in. battens with 1½in. spacing blocks). E—4in. x 2in. end wall stud. F—3in. x 2in. lever stop.

along one side of the house. A pull on this batten straightens the lever arms and raises the vents. The ventilators close under their own weight when the strain is removed.

The opening and shutting movements are controlled by a lever consisting of two pieces of 3in. x 1in. timber joined together with 1½in. spacer blocks so that the lower portion of the lever fits over the bottom runner, to which it is bolted loosely. The length of the lever is regulated by the clearance between the runner and the ridge blade. Next the middle runner is similarly bolted to the lever when the latter is vertical. To the top of the lever a wooden pulley block is attached, and a corresponding block is affixed to a 4in. x 3in. batten fastened to the end wall of the house. Rope is threaded between the two blocks, and a downward pull on the rope opens the ventilators.

The mechanism is relatively easy to operate. All the ventilators along the length of a large commercial glasshouse can be opened or closed by a woman or child.

Advantages of Design

This article covers the main points in which the Monopoli glasshouse differs from orthodox construction. With minor exceptions woodwork conforms to general dimensions, and the utilisation of materials follows the recognised methods of glasshouse construction.

Advantages of this structure may be summarised as:—

Structural stability with simplicity of design;

Freedom from interior ground obstruction;

Adaptability for different roof angles;

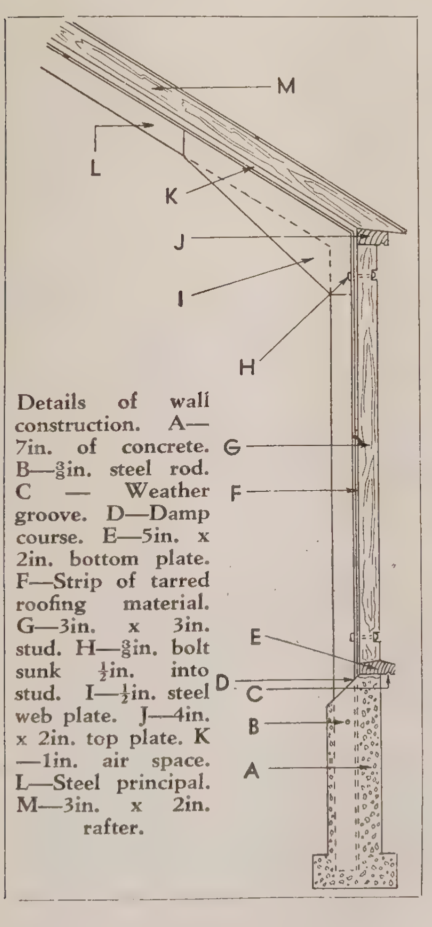
Lower depreciation and upkeep cost;

Easier replacement of wooden portions;

Freedom from wooden cross-members and ridge bracing, resulting in less loss of light;

Insulation of wooden and metal members;

Relatively-low cost of construction compared with other wood-steel types.

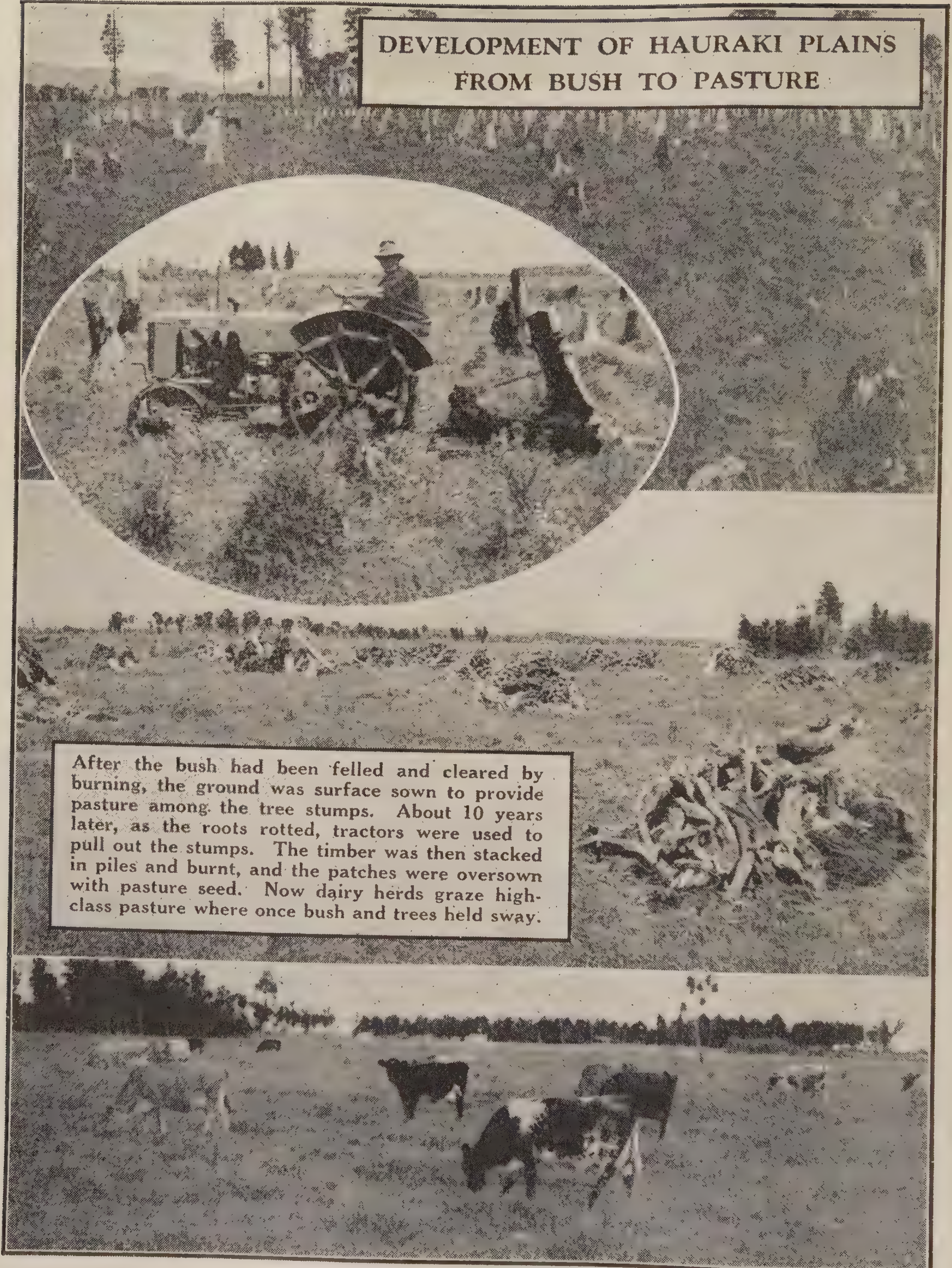


Details of wall construction. A—7in. of concrete. B—⅜in. steel rod. C — Weather groove. D—Damp course. E—5in. x 2in. bottom plate. F—Strip of tarred roofing material. G—3in. x 3in. stud. H—⅜in. bolt sunk ½in. into stud. I—½in. steel web plate. J—4in. x 2in. top plate. K—1in. air space. L—Steel principal. M—3in. x 2in. rafter.

[*R. T. J. Blick photo.*

Vent-opening mechanism, showing the end levers and the placing of the pulley blocks. The push rods of the first two ventilators are almost in the fully-open position.

DEVELOPMENT OF HAURAKI PLAINS FROM BUSH TO PASTURE



After the bush had been felled and cleared by burning, the ground was surface sown to provide pasture among the tree stumps. About 10 years later, as the roots rotted, tractors were used to pull out the stumps. The timber was then stacked in piles and burnt, and the patches were oversown with pasture seed. Now dairy herds graze high-class pasture where once bush and trees held sway.

FARMING IN NEW ZEALAND

The South Auckland District

THE influence of climate on production, the rise of all-grass farming, and some of the problems with which farmers in South Auckland must contend are reviewed in this, the concluding section of an article by C. Walker, Assistant Fields Superintendent, Palmerston North. In the first section, published last month, farming in the area was surveyed county by county.

THE assertion that the natural fertility level of most of the South Auckland district is low is amply borne out by an examination of the country in its virgin state, yet the figures for stock and production indicate that the land ranks with the most productive in the Dominion. Undoubtedly that is in large measure the result of a very favourable climate which permits farmers to exploit to the full every aid to production at their disposal.

The chief features of the climate are, first, its comparative freedom from prolonged periods of very cold weather. Apart from a few areas in the southern districts, the winters are fairly mild and provide little more than occasional frosts. Prolonged cold winds are practically unknown, and the winter sunshine is usually ample to maintain a fair measure of daily warmth and growth. Second, the spring weather usually arrives about late August, after which there is a gradual improvement throughout the summer. Autumn weather is also very favourable in average years. Rainfall is usually very well distributed, even into the hotter months, so crop and pasture growth can be maintained reasonably well.

Such a climate, with its mild winters and mild to hot spring to autumn period, relieves the South Auckland farmer of many of the problems of his less fortunate fellows in colder districts, where special crops and considerable reserves are necessary to tide stock over periods of prolonged shortage. The climate has been a vital factor in land development because of the opportunities it has provided not only of establishing pastures but of maintaining production from them throughout most of the year.

All-grass Farming

In the early days of settlement, and particularly before the introduction of topdressing, pastures deteriorated rapidly and sown species such as ryegrass, clovers, and cocksfoot were soon replaced by inferior grasses and flat weeds. Consequently cropping had to be resorted to for supplementing pasture production, and also to provide a rotation through which to re-establish grass. At that time pastures depended on the little fertility in the soil, and it was very apparent how poor they were. Obviously pastures alone could not meet the position unless stocking was reduced, so some cropping became essential on most of this land. The type of farming, too, was governed by the quality of the pastures, so much greater reliance was placed on the production of wool, mutton, beef, and store stock than on dairy produce.

About the beginning of the present century some attention was given to pasture topdressing, and initial results were so encouraging that the practice soon spread from farm to farm and from district to district. Bonedust, blood and bone, basic slag, and superphosphate were used in succession, but now superphosphate has almost completely displaced all others in popularity. In the first instance improvement became apparent in increased production from young swards, followed by the dominance of ryegrass, cocksfoot, and clovers. It was found that these pastures did not run out so rapidly, nor did they become invaded with flat weeds and inferior grasses. Topdressing of young swards became regarded as sound and something to repeat from year to year. Later the application of fertiliser to old pastures brought back better grasses and reduced the proportion of weeds. The practice soon developed until much of the grassland was receiving either annual or periodic dressings.

Though in general fertilising appeared to be sound, on large tracts of really inferior pasture it would have been better to have used the plough and resown, or to have surface sown, before fertiliser was applied. As that fact emerged the very poor swards were broken up and cropped before being returned to grass. Where the land is too steep for that, oversowing with clovers and a light seeding of ryegrass and cocksfoot would do much to improve the efficiency of topdressing.

In the wake of better production came problems of utilisation. Subdivision soon proved inadequate, with the result that it was considerably improved by reduction in paddock sizes. Then it was realised that alternate spelling and grazing—rotational grazing—gave more production and better-quality feed than set stocking. That led to considerable experimentation on farms and research areas, with the result that now there are few good farms where some form of rotational grazing is not practised.

Improvement of Pasture Species

One factor that presented considerable difficulty in the early stages of developing an all-grass theory was the unreliability of many of the leading pasture species. Many farmers found that such species as ryegrasses, cocksfoot, and white clover, on which they depended for permanent swards, would disappear almost entirely in two or three years, though topdressing was maintained. That in itself acted as a deterrent to cropping and the renovation of pastures by resowing, as there was no certainty that the new sward would equal that which was to be broken up.

The weakness lay not in the species sown but in the inferiority of the strains that had developed in some leading seed-production districts. To correct the position, and to give farmers some measure of protection, a

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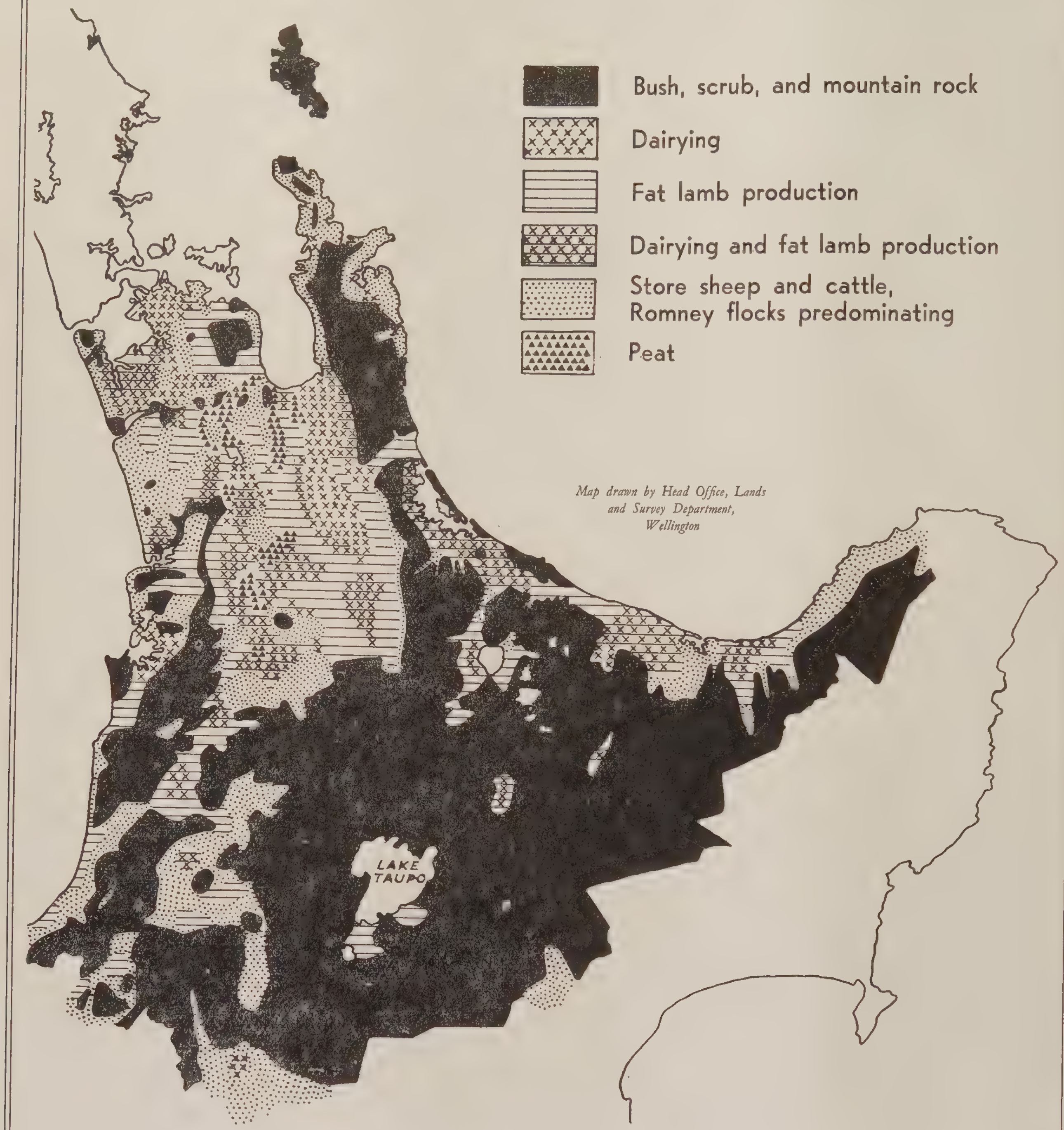
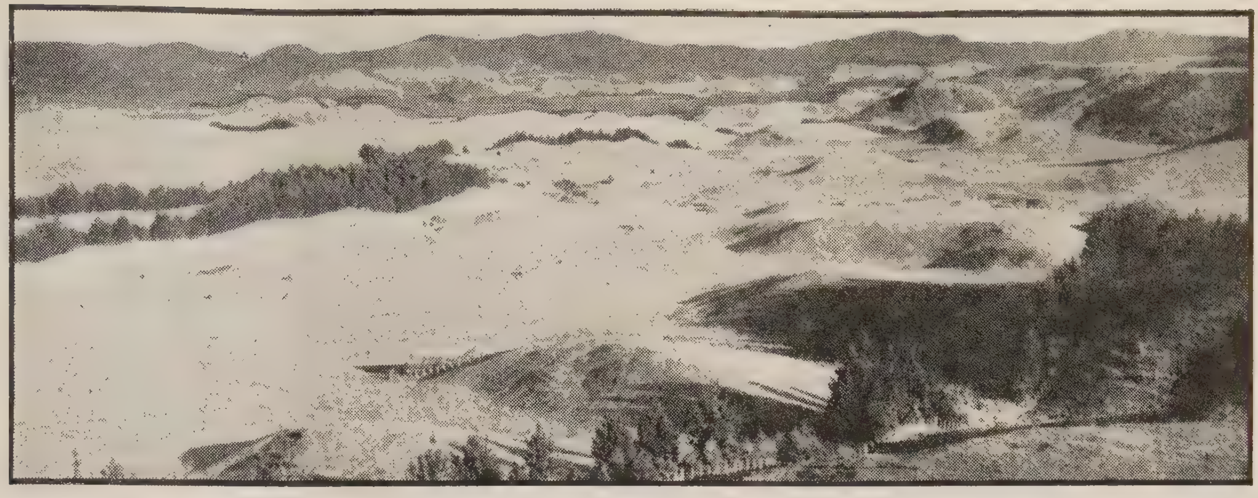
Heading photograph by National Publicity Studios.

FARMING IN SOUTH AUCKLAND


Bush, scrub, and mountain rock
Dairying
Fat lamb production
Dairying and fat lamb production
Store sheep and cattle, Romney flocks predominating
Peat
LAKE TAUPO

Map drawn by Head Office, Lands and Survey Department, Wellington

Statistics taken in January, 1947, show that the 23 counties of the South Auckland district with which this article deals contained 5,835,928 acres. Holdings numbered 19,941, the average size being 292 acres. Livestock totals at the same date were: Cattle 1,509,264, dairy cows in milk 675,522, pigs 259,095, sows one year and over 32,013, sheep shorn 3,646,814, lambs shorn 951,956, lambs tailed 2,294,086, horses 52,470.



Pastures and shelter on portion of Ngakuru settlement.

programme of plant breeding, followed by Government certification of seed, was introduced, and this work has progressed so satisfactorily that not only has permanency been assured, but productivity of the species has been greatly improved. Furthermore, by selection and breeding, production has been better spread through the year.

With these assurances of success the renovation of old swards could be approached with confidence. Much progress has been made, but the war years, with their shortages of manpower and fertiliser, retarded what might have been an extensive renovation programme throughout the territory.

The establishment of really high-class pastures with the latest excellent strains has created an even greater reluctance in farmers to break up grassland for cropping, and now only the poorer grassland will be tackled, and then only to replace it with a good pasture. With the development of better pasture strains and strains giving better-spread production, work has also been carried out with topdressing to induce a more balanced production throughout the year.

In general there are no problems of spring and autumn production. In the spring production is so abundant that ample feed is available in normal years for stock and for providing reserves of hay and silage. Likewise, in the autumn growth into early winter leaves nothing to be desired. Periods of shortage may occur in late summer and late winter, though where paspalum thrives a shortage in the former period is unlikely.

The aim should be to improve growth in shortage periods, and that can be effected to some extent by manipulation of topdressing coupled with spelling of fields. Instead of applying all the fertiliser at one time, the supply may be divided and applied with the object of inducing extra growth in lean periods. Undoubtedly the winter shortage is the more acute, so most of the fertiliser should be spread in early autumn. Coupled with this, a few fields could be kept out of the grazing scheme until midwinter to provide the extra feed required from then until early spring; in late spring a few fields might be topdressed and held for late summer grazing. By these means, and by the sowing of really-good pasture mixtures, grass growth can be reasonably abundant for nine to ten months of the year and sufficient for the remaining period to provide some grazing supplemented by hay and silage. Stock are therefore catered for without resort to much cropping.

However, the whole system depends on the establishment of good pastures and their maintenance in first-class condition, which can be achieved only by good grazing technique associated with efficient topdressing, regular harrowing to spread droppings, and possibly an occasional topping with the mower to control fields that get out of hand in periods of high production. All available fodder should be converted to hay or silage, as a high reserve level must be maintained to operate an all-grass system. This type of farming has a weakness in that it depends entirely on the climate. A good sward produces little more than a poor one during a drought. Consequently reserves must be built up in favourable years to offset the possibility of an occasional bad season.

In many parts of South Auckland pampas grass is grown to supplement other forms of winter feed.

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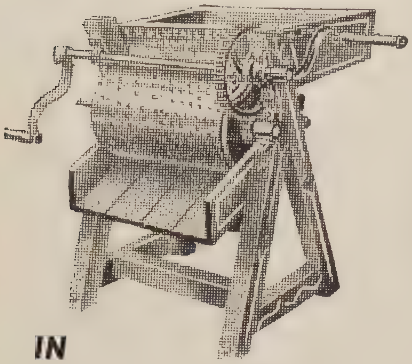

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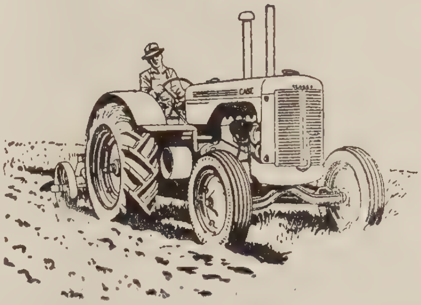

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[V. O. Browne photo.

Surrounding Waihi is one of the few farming districts which have been found to respond well to applications of potassic fertilisers.

Reversion and Erosion

Reversion and erosion are often associated in the South Auckland district, as reversion is most apparent under high-rainfall conditions and erosion here is entirely caused by water action. Consequently these problems are present to the greatest extent on such areas as the west coast and western upland, the east coast, and the Coromandel Peninsula. All of these districts have a rainfall exceeding 50in. and, without exception, they contain much broken and poor country.

When the bush was removed there was insufficient fertility to establish a close grass cover that would exclude second growth, and the carrying capacity was so low and the areas so remote as to preclude topdressing. With the opening up of the sward, and under the high rainfall, piripiri, bracken, hard fern, manuka, and tutu have established and overrun much of the land. Later, with the rotting of forest tree stumps, water action has resulted in considerable slumping of the ground surface. These scars in turn have become overgrown with second growth or have been extended by subsequent falls.

Reversion cannot be overcome by firing and resowing alone; they must be associated with better subdivision, manuring, seeding, and stocking with cattle. Unfortunately, a good deal of the country would not respond sufficiently and could not be approached economically along these lines at present. Such land would probably be better planted in timber than persevered with for farming.

Reversion is quite a serious problem on poor hill country, and in parts erosion is sufficiently serious to cause some concern, though it is not as bad as in other parts of the North Island.

Weed Problems

Since land development began in South Auckland weeds have presented difficulties. Chief of them are ragwort, gorse, blackberry, piripiri, hard fern, and buttercup.

Ragwort

In the western Bay of Plenty, Rotorua, and parts of Waikato ragwort was particularly bad for a number of years. Under the system of liberal topdressing and dairy farming it flourished to such an extent that farmers were forced out of dairying, and in many instances whole blocks of farms were abandoned.

Where farming was continued it was essential to change from dairy stock to sheep to obtain some reasonable control, but unfortunately most of the ragwort country was also subject to bush sickness, so sheep had to be changed at frequent intervals to keep them healthy. Later, with the introduction of cobalt topdressing, the difficulties of maintaining sheep on ragwort areas were removed, leading to considerable extension of sheep numbers. For example, the sheep population of Tauranga County rose from 18,000 to more than 185,000 in 25 years.

Where sheep could not be run considerable relief was obtained by applications to the weed of sodium chlorate, either in solution or mixed with lime. This weedkiller made it possible to continue dairying on many farms; it is a fair assumption that without it many more areas would have been changed to sheep or been abandoned. Now ragwort is not a serious menace and control has been sufficiently satisfactory to permit of normal farming on the areas so affected.

Gorse and Blackberry

Both gorse and blackberry are troublesome in waste places, where they fill gullies and trespass on neighbouring grassland. Gorse has proved particularly bad as a weed of poor hill country on the Coromandel Peninsula. Both are especially troublesome in western Bay of Plenty, on the Coromandel Peninsula, and just south of Auckland.

Control appears to be restricted to cutting or crushing, followed by firing, sowing to good pasture, and constant defoliation of subsequent growth to weaken the plants. Sodium chlorate is only partially effective and the newer hormone weedkillers do not appear to be very effective.

Piripiri and Hard Fern

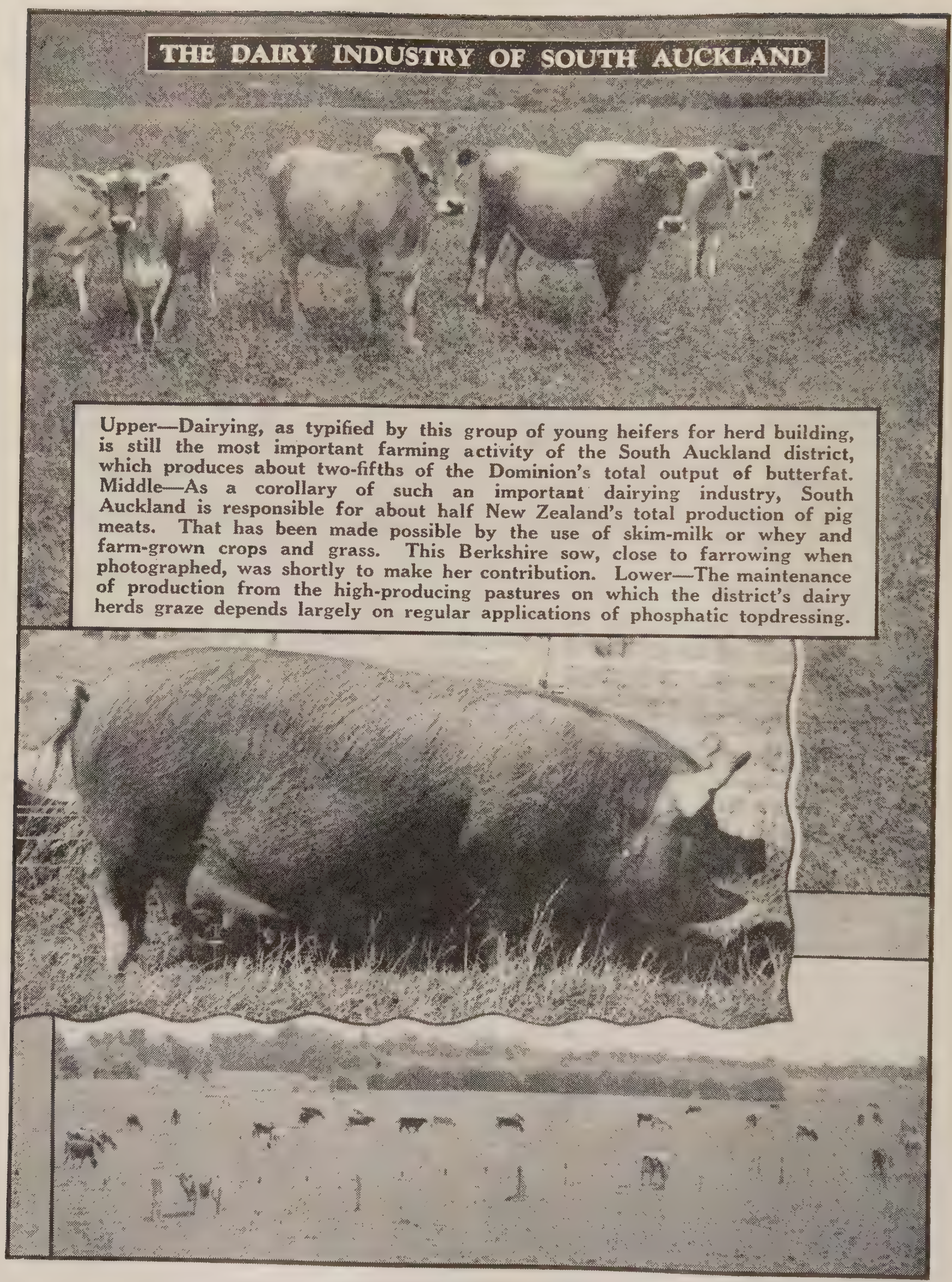
On poor, steep hill country where rainfall is high piripiri and hard fern are common. They invade weak pastures and cannot be controlled by sheep. Effective control is possible only by using cattle, and with them must be associated a system of rotational grazing that will lift the plants and enable them to be destroyed.

Buttercup

A weed of wet lands, buttercup is particularly bad on areas that are subject to winter poaching. On the Hauraki Plains, in parts of the Bay of Plenty, and on meadow soils in the Waikato it shows up very prominently in late spring.

Control should aim at maintaining an unbroken sward in spring. Though

THE DAIRY INDUSTRY OF SOUTH AUCKLAND



Upper—Dairying, as typified by this group of young heifers for herd building, is still the most important farming activity of the South Auckland district, which produces about two-fifths of the Dominion's total output of butterfat. Middle—As a corollary of such an important dairying industry, South Auckland is responsible for about half New Zealand's total production of pig meats. That has been made possible by the use of skim-milk or whey and farm-grown crops and grass. This Berkshire sow, close to farrowing when photographed, was shortly to make her contribution. Lower—The maintenance of production from the high-producing pastures on which the district's dairy herds graze depends largely on regular applications of phosphatic topdressing.

[V. C. Browne photo.

Situated at the southern end of the Bay of Plenty, Opotiki serves a considerable area of recently-developed dairying land as well as a large area of steep, poor hill country. In its early years of development Opotiki was the centre of the main maize-growing activities in the Bay of Plenty.

that is difficult on such soils, it can be effected after winter grazing and while the surface is still soft if the land is rolled with a Cambridge roller. For this to be effective, the surface should be soft enough to roll together and give a continuity of pasture. On the Hauraki Plains, where a good deal of rolling is done, fields that have not been treated stand out as masses of buttercups in late spring while the rolled areas are comparatively free.

In general. weed control depends on good pasture establishment and regular manuring to preclude the entry of weeds into the sward. Good husbandry will do much not only to reduce the amount of annual weeds present, but also to prevent the entry of perennial types.

Soil Deficiencies

Apart from the deficiency in fertility which can be met by suitable topdressing with phosphates, lime, and potash, there are deficiencies of minor or trace elements in some soils that have had a detrimental effect on stock. Chief of these deficiencies are cobalt and copper.

Cobalt

Throughout the central volcanic plateau and extending on to the Western Upland and into the Waikato are areas subject to what has been popularly known as bush sickness. It is an unthrifty condition in cattle and sheep which has been shown to be caused by a deficiency of cobalt. Full details of diagnosis, cure, and treatment are given in the joint recommendations of the Department of Agriculture and the Cawthron Institute, published in Bulletin 180, "Cobalt Deficiency in Sheep and Cattle," which is available free from any office of the Department.

Copper

On some of the peat soils of the Waikato, Hauraki Basin, and Bay of Plenty cattle have been affected rather seriously by scouring. Research has shown that this was caused by a deficiency of copper. Copper-deficient soils have been studied by officers of the Department of Agriculture and the problem of copper deficiency is dealt with in Bulletin No. 238, "Copper Deficiency in Cattle and Sheep."

Drainage

Much of the obviously-wet peat and alluvial lands of South Auckland have depended on drainage schemes for land development, and large tracts of virgin land will require provision for drainage before they can be brought into production. Areas such as the Hauraki Plains, Rangitaiki Plains, and developed peat land in the Waikato are productive today only because of the success of drainage schemes. However, constructional work is only part of the programme and should be associated with ample provision for maintenance to keep waterways functioning efficiently.

Where maintenance is neglected drainage systems are likely to become infested with growth that reduces the efficiency of drains and canals. Such a condition has arisen on the Hauraki Plains where *Glyceria aquatica* (commonly called *Poa aquatica*) has been permitted to infest waterways without check. As a result the grass has now taken charge, most waterways are almost completely blocked, and removing it will cause much trouble. In the meantime it is menacing adjacent farm lands.

In general, drainage has been restricted to land that obviously needed such treatment, but little attention has been given to those clay and meadow soils already in pasture but lying fairly wet in winter. As excess water keeps soils cold, it can be assumed that many of these soils would be improved by some form of drainage. With the removal of surplus soil water, root penetration would be deeper, feeding zones expanded, and the effects of dry periods greatly reduced. Underground drainage of the mole drain type or with tiles should be given greater attention and be put into effect where practicable.

Though it is reasonably easy to assess the value of initial drainage on very wet land, few people appreciate fully what drainage can do to aid production on partially-improved country. One thing is certain, however: The potential benefits of better pasture species, topdressing, and climate cannot be exploited until some initial drainage is carried out on wet land. Surely, then, fully-efficient drainage may be expected to confer even greater benefit on the country.

Transport Facilities

In the early days of settlement much of the inward and outward goods was transported from and to Auckland by coastal shipping plying on the east and west coasts. As most of the harbours were fairly shallow, vessels were limited in size and much use was made of scows. Such ports as Opotiki, Whakatane, Tauranga, Whitianga, Coromandel, and Thames on the east coast, and Raglan and Kawhia on the west, had their regular shipping connections

[V. C. Browne photo.

Developed from a sawmilling town, Taumarunui is now the centre of an increasingly-important pastoral district.

with Auckland or Onehunga. In a few instances navigable rivers provided waterways—the Waihou and the Waikato as far as Te Aroha and Hamilton respectively. From these points transport was by road, using horse or bullock traction according to conditions.

With railways serving most districts and the construction of good roads for motor transport, the coastal shipping service has now been almost completely displaced by land haulage. Rail services extend from Auckland south by the main trunk line and east to Rotorua in one direction and down the coast through Tauranga to Taneatua in another. Short feeder lines to such points as Thames and Cambridge cater for other districts, and a projected line from Paeroa to Pokeno will shorten considerably the haulage from east coast districts. On the whole the greater part of all haulage is by rail to points from which feeder services deliver to townships or farms by motor transport.

Similar provision is made for passenger transport, though in addition to the railways there are numerous bus services and a limited air service connecting Auckland with Hamilton, Tauranga, and Opotiki.

Main Centres

In view of its importance as an overseas terminal for sea and air services, Auckland City is the principal centre for imports and exports. However, within the South Auckland area Hamilton is undoubtedly the chief centre from the viewpoints of both size and commercial activity.

Other centres of importance are Tauranga and Whakatane in the Bay of Plenty, Rotorua on the central volcanic plateau, Morrinsville, Matamata, and Cambridge in the Waikato, Te Kuiti and Taumarunui in the western uplands, and Thames serving the lower Hauraki Basin and Coromandel Peninsula. All are essentially farming centres catering for the requirements of farmers and handling their produce.

Future of District

Notwithstanding any possible changes in markets, this area, endowed with a very fine climate, will remain essentially grassland country where production will depend on what can be produced on pastures. Dairying, with fat lamb production becoming a close rival, should continue to dominate the position, though it would not be surprising to see some impetus to the production of "baby" beef.

When a return to normal trading brings ample supplies of fertiliser, seed, oil fuel, implements, and fencing materials, the over-all quality of pastures should improve rapidly throughout South Auckland. Heavier top-dressing, resowing of run-out areas, and subdivision of farms will lead to an immediate increase in production. It is not unreasonable to expect land development to proceed apace, with a great deal of the partially-developed and undeveloped lands of Rotorua-Taupo, Bay of Plenty, Waikato, King Country, and Hauraki Plains receiving most attention. The large areas of relatively-untouched pumice soils of the central volcanic plateau appear to offer greatest scope for development at lowest cost, but any such work should be closely associated with the findings of research workers, who have studied and solved quite a few of the problems confronting farmers on this area.

General farming trends will be influenced, no doubt, by the scope of world markets, but the overseas demand for dairy products, fat lamb, and beef seems likely to remain. No other district can excel South Auckland in general pasture production, so the future seems to be assured for those who concentrate on such production.

A Maori homestead on Coromandel Peninsula. Throughout South Auckland numerous development schemes provide opportunities for Maori farmers to acquire land and become producers.

STERILITY, LATE CALVING, AND ABORTION LOSSES FROM BOVINE TRICHOMONIASIS

By T. M. DOCKER, *Veterinary Research Officer, Ruakura Animal Research Station.*

AMONG the many tiny parasitic animals which prey on livestock, causing disease and consequent loss of production, is an organism called trichomonas foetus, which is responsible for the venereal disease of cattle, trichomoniasis. This parasite was discovered in France toward the end of the last century, but it is only during the past 12 years or so that it has been studied extensively and attempts made to control the disease, which is obviously world-wide in distribution.

THE presence of trichomoniasis in New Zealand has been suspected for many years, but though the disease has been looked for on many occasions, only one instance of its existence here has been recorded. T. A. Blake, of the Ruakura Animal Research Station, found the first case in 1937. Not until during the last 12 months has the organism been definitely located on a number of widely-separated farms. As the result of this recent work, taken in conjunction with the case histories of many herds affected with temporary infertility, it can be concluded that trichomoniasis not only exists in New Zealand, but that it may be widespread.

Though the full extent of the loss to the dairy and meat industries is not known, it is evident from recent research work that losses from sterility, late calvings, and abortions due to trichomoniasis must amount to many thousands of pounds annually.

Calfhood vaccination is reducing the number of abortions due to brucellosis (contagious abortion), but it will not prevent abortions or infertility due to trichomoniasis.

Diagnosis of trichomonas disease is often difficult, but where cows are hard to get in calf, and particularly where many cows return to the bull at irregular intervals or some cows slip their calves in the early stages of pregnancy, the disease should be suspected and the services of a veterinary surgeon obtained if possible.

Trichomoniasis in the Bull

Trichomonas foetus belongs to that group of minute animals known as protozoa. It is oval or pear shaped and under the microscope is seen to move very rapidly. It is less than a fifteen-hundredth of an inch long. When a bull becomes infected after serving an infected cow there may be an initial acute inflammation lasting a day or two, but as a rule there is no outward sign that he has contracted the disease. The parasites invade the lining of the sheath and the penis and establish themselves so well in the tiny crypts formed by the minute folds in these membranes that it has been found impossible by antiseptic washings to kill them all and effect a cure. So far there is no method of treatment of the bull sufficiently reliable to be of practical use. Recently some American workers have reported a percentage of cures after an injection of a chemical into the bloodstream, but because of the difficulty of finding trichomonads in the bull, and the fact that failure to find them does not necessarily mean freedom from infection, any treatment would have to be followed by a practical test, for example, mating the bull with a small number of cows or heifers to see if they develop the disease.

Trichomoniasis in the Cow

If a herd sire is affected with trichomonas disease at the beginning of the mating season, the usual result is that many cows return to service at irregular intervals over a longer period than normal. In some herds the cows appear to have settled in calf, and then, about six weeks to two months after mating, quite a number return to the bull. The majority of affected cows actually conceive, but abort at a very early stage of pregnancy. Not all cows served by an infected bull abort, first because parasites are eliminated intermittently and some cows may escape infection, and secondly because some cows may be immune due to previous contact. Immediately after abortion a thin, flaky discharge, which is usually teeming with the parasites, may be seen. Often, however, no abnormality is noticed, and the first sign that anything is wrong is a return to the bull. Because cows in New Zealand are at grass all day and night, except for an hour or two at milking time, the chance of observing a small, recently-aborted foetus, measuring commonly 2 to 4in., is not very great. Foetuses which are occasionally found provide one of the most reliable means of diagnosis, because fairly-fresh, positive cases contain numerous trichomonads.

A small percentage of cows develop what is known as a pyometra (a uterus full of pus) instead of a calf. The uterus so affected may contain more than a gallon of thin pus swarming with the organisms. Such cases do not exhibit signs of heat and are thought to be in calf unless the pus is escaping from the uterus and causing a discharge from the vulva.

Control of the Disease

A veterinary surgeon called to see a herd where the disease is suspected will often want to examine all the animals which have apparently settled in calf to determine whether there are any suffering from pyometra. As the vast majority of cows rid themselves of infection if they are allowed a period of rest without being bred, it is often impossible to find the parasite in empty cows. In overseas countries it is usually recommended that cows be given a period of two to three months' rest and artificial insemination employed after that. This procedure

Foetus of calf, age 10 weeks. A recently-aborted foetus provides one of the most reliable means of diagnosis of trichomonas disease, because fairly-fresh, positive cases contain numerous trichomonads.

CONTROL OF BOVINE TRICHOMONIASIS . . .

makes sure that in the event of any cow's still being infected the disease will not spread. Obviously in this country it would be impracticable to allow the cows two to three months' rest, as the disease would not be diagnosed in most herds until near the end of the normal mating season. The next best thing would be to cut down the resting time, but to allow two heat periods to go by and then use artificial insemination. This would not be very practicable here for the following reasons:—

(a) Artificial insemination is not yet available from commercial organisations.
(b) Probably not many farmers would want to go to the trouble of learning the technique, which requires a good deal of time and patience, and applying it in their own herds.
(c) Cows in infected herds would calve very late, even if inseminations were successful.

If the disease has been diagnosed reasonably early in the season and there is no objection to having late calvers, the rest period can be followed by the introduction of a non-infected bull. If this method is adopted, however, there is a danger that the new bull will become infected, but this risk may be worth taking. The main consideration is to get the cows in calf, not to breed calves for replacement purposes, so that any fertile bull, irrespective of pedigree, will suffice.

In this country control measures will usually aim at the prevention of a recurrence of the trouble in the following season. This can best be effected by disposing of all bulls which have been used on the infected herd to freezing works. Fresh bulls should be from herds which have had good breeding records. A yearling bull which has run only with heifers that have settled in calf normally will be suitable to use on the herd as a two-year-old in the following season. If such a bull has been used even with one cow of the infected herd, he must be considered suspect. Owners of large herds where the disease has been suspected but not definitely diagnosed may be reluctant to dispose of all bulls. In these cases it is a good plan in the following season to put each bull to a section of the herd, and any cows which return to service should be put back to the same bull. In this way, if infection is still present, it will be limited to those cows served by the infected bull.

Cows suffering from pyometra or others which are continually discharging pus may be treated by a veterinary surgeon, but though the majority of these cows will become free of infection, some will be incapable of having any more calves because of blockage of the ducts along which the spermatozoa have to pass to reach the egg. It is advisable, therefore, to cull all discharging cows.

For replacement purposes in-calf heifers or cows which are due to calve early should be purchased from herds which have had no breeding trouble. No cows should be mated before the third heat period after calving. Any which do not come on heat within two months of calving should receive veterinary attention.

It has been suggested that the disease be made notifiable and movement of animals to and from infected premises controlled, but most authorities agree that this would be unwise until a more reliable means of diagnosis is found, because it would obviously cause a lot of inconvenience to a herd owner whose cattle were suspect.

If nothing is done to control the disease and mating is continued until late in the season, many cows develop immunity and get in calf eventually, but the calving rate is very unsatisfactory and there are of course many late calvers. The following is an example of what can happen:—

A herd of 56 cows was served by an infected bull. Only two cows settled in calf to the first service. Mating continued from late September until mid-March, during which time the majority of cows had received four or more services at irregular intervals. Eventually 33 cows settled in calf, but 6 of these aborted.

In this herd in the following season 29 of the original cows which included only 18 which had calved normally were kept and the number made up to 59 with bought-in heifers and cows. Using a fresh bull very satisfactory results were obtained. Forty-two cows conceived to the first service, and only 2 failed to settle after a second service.

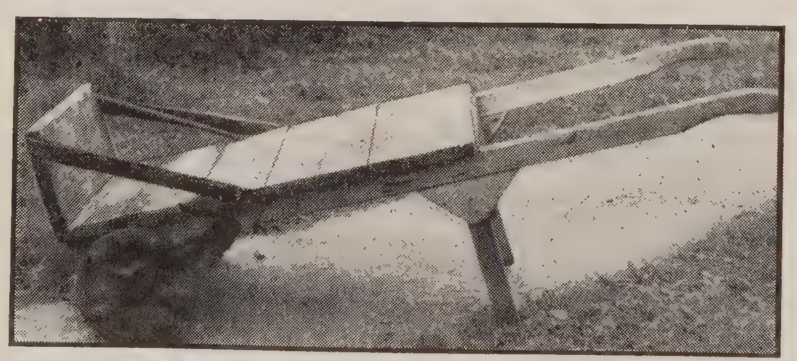
There are other causes for cows' not getting in calf easily and these may often lead to a state of affairs resembling that which exists in trichomonas infection. Two examples are:—

1. When a weak or sterile bull is used many or all cows will return to service, but they will return at **regular** intervals, though a small number often return at irregular intervals due to various causes of a non-infective nature.
2. If a herd is badly affected with contagious abortion the majority of cows or heifers which slip their calves will do so at 5 to 8 months, but a few earlier abortions (at 2 to 5 months) can be expected. There is often difficulty in getting cows in calf after they have had this disease. However, it is usually a simple matter to find out by blood testing whether contagious abortion is the cause of the trouble.

To sum up, if trichomonas disease is suspected in a herd, a veterinary surgeon should be consulted at once. If a diagnosis of trichomoniasis is made, the following measures should be taken to prevent a recurrence of breeding trouble.

1. All bulls should be sent to the works unless they have been used only on maiden heifers which have settled normally.
2. Replacement bulls should be bought as calves, as otherwise there is a risk that they may have served infected cows.
3. All empty cows not worth keeping as "carry-overs" should be culled.
4. Empty cows which are kept should not be served until they have shown at least three normal heat periods at regular intervals.
5. Even cows which calve normally should not be served until the third heat period after calving.
6. Any cow which does not come on heat regularly should be examined by a veterinary surgeon.
7. Replacement cows should be bought as in-calf yearlings and the above precautions in regard to subsequent mating must also apply to these.
8. Steps should be taken to ensure that bulls cannot wander off the premises or that neighbours' bulls cannot gain access to the herd.

Home-made Utility Hand Truck



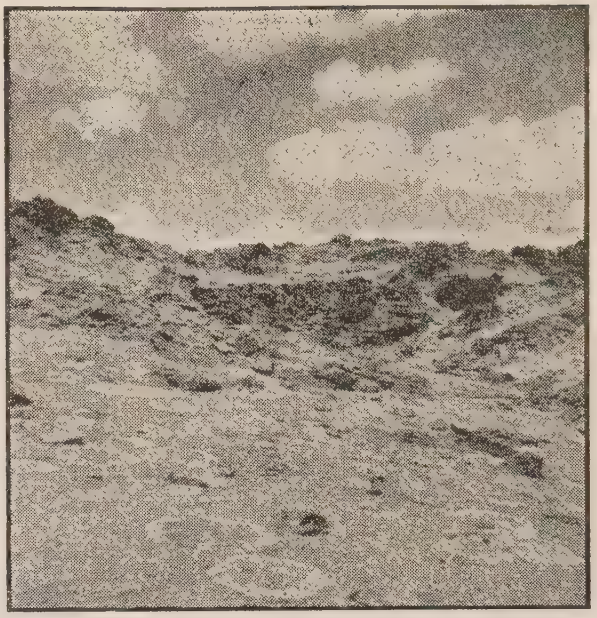
Frequently on the farm the need arises to transport over short distances weighty objects such as cases and cream cans, and for such purposes the utility hand truck illustrated is very useful on the farm of Mr. A. V. King, Clydevale, Otago. It is more stable, lower slung, and easier to push than the ordinary wheelbarrow. Constructed from the wheels and frame of an old 14in. lawnmower and timber oddments, this "carry-all" can be put to many and varied uses. Timber used for the handles and legs is 2in. x 1in. and the decking and upright end are 1½in. thick. The brackets are of hoop iron.

—*J. G. RICHARDS, Instructor in Agriculture, Balclutha.*

WINGED THISTLE IN CENTRAL OTAGO

By S. H. SAXBY, *Agrostologist, Wellington.*

WHILE Waikato dairy farmers are doing their utmost to rid their properties of a weed which they call winged thistle, runholders of the depleted area of Central Otago are expressing concern over the virtual disappearance of a plant which they call star thistle. Curiously enough the winged thistle of the Waikato and the star thistle of Central Otago are one and the same plant, whose proper name is *Carduus tenuiflorus* (previously *C. pycnocephalus*), and which is most commonly known as winged thistle. As the name star thistle is generally given to an altogether different plant *(Centaurea calcitrapa)*, the name winged thistle will be used in this article to save confusion.



On severely-depleted winter country of Central Otago winged thistle provided valuable winter feed.

MANY years ago, not long after the rabbit had become thoroughly established in Central Otago and when the tussock was going out rapidly, winged thistle apparently appeared over large areas of the valuable lower winter country. Far from being regarded as a weed, its advent was more than welcomed by runholders.

Value on Otago Runs

The following interesting reference to winged thistle in Central Otago is made on page 134 of the 1909 annual report of the Department of Agriculture:—" . . . winged thistle which is in many places a noxious weed is on mountain faces a very valuable plant, furnishing fodder for stock before the native grasses come on. Its presence has, in fact, increased the value of some of the Central Otago runs."

In his "Report on the Grass-denuded Lands of Central Otago" published in 1912, Dr. D. Petrie, while discussing annual plants in general, wrote as follows:—"The most remarkable of these plants, mainly confined to the hill slopes and valleys, is the annual winged or star thistle (*Carduus pycnocephalus*), which has for many years spread far and wide, in greater or less abundance, over the hills of inland Otago. Wherever it is plentiful it affords a very considerable bulk of highly-nutritious feed. There are experienced runholders who reckon it little inferior to rape. The young plants that shoot up after the earliest autumn rains form the main and almost the sole winter feed in the desert lowlands. The old dry and withered stems are also completely eaten out at this season of scarcity. A second growth from more dormant seeds usually starts up in early spring, so that its utility is not restricted to the hardest time of the year. Though the earlier plants are so closely eaten back that they would hardly be expected to flower, they later on send out secondary shoots from the axils of the stem leaves, and then these produce enough seed to renew the crop. In other circumstances the winged thistle might be ranked as a 'noxious weed,' but it is the runholders' sheet-anchor in extensive areas of Central Otago and elsewhere."

Various thistles still persist in some localities, particularly on dark faces and where the surface is comparatively loose.

Disappearance Regretted

For a number of years now winged thistle has been virtually absent over much of the country where it was previously considered to be so valuable. Its disappearance has in many cases accentuated an already difficult winter feed position, and most runholders would therefore doubtless welcome the return of winged thistle to their barren winter country.

Many reasons have been suggested for its disappearance. In the "Journal of Agriculture" of March, 1916, E. H. Atkinson says on page 184, "It [winged thistle] is the most ephemeral of all the introduced thistles, ground which is covered with it one year often being entirely free from it the next." This comment may possibly mark a point in the gradual disappearance of the thistle. Present-day runholders place the time of its disappearance at from 20 to 30 years ago.

Some consider that the thistle has taken certain "minerals" out of the soil and that without these it is unable to survive. Others consider that it will grow only on country that is heavily infested with rabbits, and that as the rabbits are brought under control the thistle disappears.

WINGED THISTLE IN CENTRAL OTAGO . . .

It has also been suggested that disease may have been responsible for its reduction. That this is a possibility can be understood from the comments of Dr. G. H. Cunningham on page 678 of "Transactions of the New Zealand Institute," Vol. 54. In referring to a rust named *Puccinia cardui-pycnocephali* he states, "The rust is common wherever the host (winged thistle) occurs; it appears to check seed development in the host, as one commonly finds sterile flower heads in infected plants."

Still others consider that rabbits have eaten the thistle out, though a common opinion is that it is one of the few plants eaten by sheep and practically neglected by rabbits. Writing in the "Journal of Agriculture" (page 346 of the December, 1920, issue), Dr. L. Cockayne said, "The winged thistle considered by all the Central Otago sheep farmers a valuable pasture plant, notwithstanding its fair measure of palatability when young, is by no means suppressed by sheep and rabbits in the seedling stage—be food never so scanty—but by means of self-sown seeds rapidly seizes on very large areas indeed. Thus palatability is not altogether a bar to the establishment of a species in the presence of innumerable rabbits."

Conditions for Reseeding

Though winged thistle has undoubtedly disappeared over large areas, it has managed to persist through reseeding under certain conditions, and a study of these conditions may provide at least a partial explanation of its having flourished previously.

Nowadays winged thistle appears to be confined largely to situations that have a loose, broken surface in which the seeds are able to germinate readily. It is not uncommon on places such as the edges of private roadlines which are occasionally graded and where the disturbed ground apparently favours its survival. It is also present on some of the slowly-eroding, shallow gullies where there is a continued but slow movement of soil and rock particles.

As a rule the largest areas of winged thistle still persisting are usually on the shady faces of fairly-steep hillsides where the soil and small slabs of rock tend to "creep." There are, however, many roadlines, gullies, and hillsides where winged thistle has not survived.

Chances of Re-establishment

The chances of re-establishing winged thistle over widespread areas are hard to estimate. As it is an annual plant, its survival depends on its ability to produce and "sow" seed in enormous quantities each year. This, of course, applies to many other annual or short-lived plants in Central Otago, a typical one being the small, somewhat sticky annual with spherical clusters of light blue flowers very appropriately known everywhere as stinkweed (*Gilia squarrosa*). This worthless and objectionable little plant comes up throughout the depleted country on areas where the surface is broken, road edges being a particularly common location. There are also nettle and hemlock, both of which are fairly common, particularly in areas suited to winged thistle. The spear thistle (*Cirsium lanceolatum*) or Scotch thistle, as it is most commonly called, grows in similar situations.

All these require ideal conditions for their repeated annual seeding, and the fact that they are not now indiscriminately spread over the countryside indicates that these ideal conditions are present in relatively-few situations.

Winged thistle is a common annual plant in many parts of New Zealand. On high-fertility country it is rightly regarded as a weed, but on depleted country of Central Otago it is of considerable value.

Change in Soil Conditions

The fact that winged thistle and perhaps other annual plants have been widespread in the past, but have now declined, suggests that the ideal conditions required for their growth do not exist now, and that conditions of soil fertility and soil texture may have changed considerably. That such changes take place and that they can influence the growth and spread of short-lived plants are apparent after a study of changes that have taken place in about 28 years on an area on the Dunstan Range that was enclosed and sown down in 1920 by the late Dr. Cockayne. At the time of sowing down this plot was described as "an extremely steep, stony, sunny face" containing mainly closely-eaten plants of *Danthonia Buchanani*. There was no reference to thistles of any kind. This area has been visited periodically since it was first enclosed. In the early stages grasses such as cocksfoot and tall fescue struck reasonably well in association with lucerne, some of which was good and some stunted. During subsequent years the lucerne grew well, particularly on the lower portion, and by 1936 it was very vigorous. Shortly after this fencing round the enclosure deteriorated and rabbits entered and grazed the area very closely. By 1944 the lucerne had disappeared and where it had been most vigorous there was then a very plentiful growth of thistle (*Cirsium lanceolatum*). Though the fence was again made rabbit proof, the thistle began to decline, and at present it is not as common as it was several years ago.

This change from bare ground in 1920 to dense lucerne and then to the rise and decline of thistle by 1948 is of particular interest, as it may assist in explaining the rise and fall of winged thistle in general. In the enclosure there was a build-up of fertility and a loosening of the soil by the lucerne. When this was later grazed out by the rabbits the fertility and looseness were ideal for the germination and survival of such short-lived plants as thistle. When rabbits were excluded and their scrapings ceased the ground tended to consolidate, with the result that the thistle has not re-established as well, particularly as the fertility also dropped.

In the case of winged thistle in general it may be reasonable to assume that it came and went throughout the depleted country in much the same manner. The original tussock vegetation produced a considerable amount of ground litter, which in turn tended to keep the fertility at a reasonably-high level. When the tussock was burnt and rabbits came into Central Otago, conditions of fertility and looseness of soil were suitable for the establishment and re-establishment of winged thistle. Rabbits with their burrowing and scraping and return of a certain amount of fertility probably played an important part in the maintenance of the thistle population.

In the last 20 years or so rabbits have been kept in check to a very great extent on some of the country where the thistle was once so common.

The fact that winged thistle still manages to survive under certain conditions not so much of soil fertility as of soil texture suggests that it could possibly be reintroduced into those parts of Central Otago that could be readily surface worked.

Toward the end of the report by Dr. Petrie already referred to there is the following paragraph: "It should be recognised that the problem of regrassing the desert areas of Vincent County may prove impracticable. Should this be the case, I do not see why the country should not be utilised by cultivating and sowing the star (winged) thistle, which is already on the ground and is known to grow readily. There is no dearth of stations on which it could be successfully cultivated and in many places irrigation could readily be provided, as it flowers early before the creeks dry up."

Whether this suggestion made in 1912 was ever acted on by runholders is not known, but even now those who are anxious to see the thistle re-established might consider it worth trying.

Much Loss From Calf Diseases is Preventable

By P. J. McCANN, *Veterinarian,*
Department of Agriculture,
Christchurch.

ALTHOUGH accurate figures are not available, there is no doubt that the annual loss from calf diseases on farms in New Zealand is considerable. It was estimated from surveys of a number of herds in England just before the war that about 6 per cent. of calves died before the age of six months. As the surveys were made in high-grade herds, with a good standard of calf husbandry, the losses for the industry as a whole were probably even higher. Much of this annual loss is preventable if a good standard of calf management is generally adopted, and as increased dairy production in New Zealand is dependent principally on the raising of more well-grown, healthy heifers, feeding and care of the young animals should be along the soundest lines.

[*"Dairy Exporter" photo.*

AS an aid to farmers playing their part in rearing calves for the dairy industry, the commoner calf diseases and measures for their prevention are described in this article.

Scours in Calves

All new-born animals have a delicately-balanced digestive mechanism, any disturbance of which is usually followed by diarrhoea or "scours." As the calf is removed from its mother very early in life and artificially fed, it is not surprising that it is the most susceptible of all young stock on the farm to digestive derangements and bowel infections.

Scours are classified in two main types—bacterial or "white scours" and nutritional or dietetic scours—according to the cause. However, it is often difficult to distinguish between the two conditions clinically, as errors in diet are a contributory factor in most cases and the bowel infection is usually secondary.

White scours affects calves during the first fortnight of life, sometimes as early as the first day or two. It is caused by a germ called *Bacterium coli* which is a normal inhabitant of the digestive tract of every calf. If the resistance of the calf is lowered from any cause or the virulence of the bacteria increased, *B. coli* invades the bloodstream, producing a septicaemia, often with fatal results.

Nutritional scours usually occurs in older calves—from two weeks to two months old—and is more frequently found in conditions of neglect with dirty surroundings and bad feeding methods.

Predisposing Causes of Scours

1. **Failure to feed colostrum.** The first and most important item in the diet of the calf is the colostral milk, from which the calf derives its necessary supply of protective antibodies and vitamin A, both of which are absent in the new-born calf. It is essential that the calf should receive colostrum as soon as possible after birth and that it should continue to receive colostral milk for five days. As colostrum is unfit to mix with the milk from the rest of the herd, there is no excuse for witholding it from the calf. After five days the milk no longer has this special protective power.

The protective action of colostrum from some cows may be low, as for example from a cow which has come into the herd only a short time before calving and has not so far developed sufficient immunity to the bacteria infecting the herd. This possibility should be considered when a single calf develops scours in spite of careful management, in which case a change to colostrum from another cow might produce some improvement.

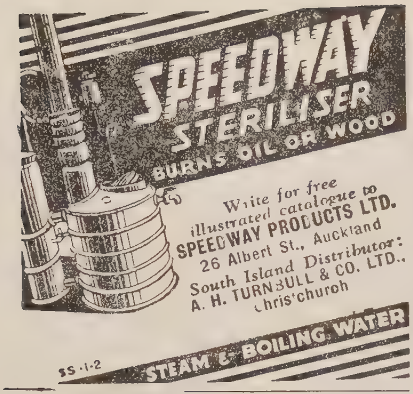
The vitamin A content of milk may also vary and is likely to be lower in cows which calve in the spring after a pregnancy on winter feed or in cows which have not been permitted a reasonably-long dry period between lactations and which have therefore not had a chance to build up vitamin reserves in the liver.

2. **Errors in feeding.** Overfeeding is the commonest fault in the diet of the young calf. If reared on the mother, the calf takes its food in small quantities and at the right temperature. When fed on the bucket it receives its food twice or, at the most, three times daily, so that each feed is comparatively bulky and often it is too cold. A hard, indigestible curd is formed in the stomach, setting up irritation and favouring the multiplication of *B. coli.*

3. After an attack of scours in one or more calves from any of the above causes the organisms responsible for the actual disease are much more virulent and may cause scours in older calves under good management.

Symptoms

Symptoms of white scours usually appear within a few days of birth. The calf is dull and has a miserable, dejected appearance, refuses to suck, and has a harsh and staring coat; its head and neck are held low and the abdomen is tucked up. Diarrhoea, which soon appears, is always greyish-white, at first pasty, but soon becoming watery, and has a strong, offensive smell. Sometimes the scours are blood



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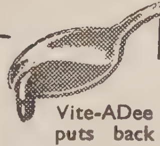

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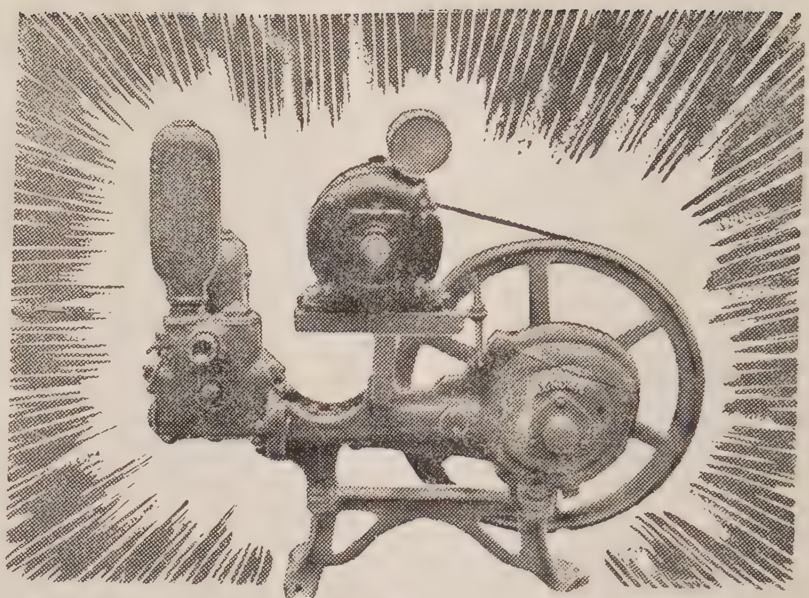

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tinged; the calf strains frequently and the tail and buttocks become very soiled. It soon becomes extremely weak and lies stretched out, and coma precedes fatal cases. Calves which recover are always stunted and chronic arthritis lames many of them.

Nutritional scours affecting older calves is generally characterised by a thin, watery, sometimes frothy diarrhoea, usually dark and foetid. The calf is dejected, shows signs of abdominal pain, rapidly loses condition, and becomes weak. Occasionally the disease takes a very acute course, with bloody diarrhoea (dysentery), death ensuing sometimes within 24 hours.

Treatment

The affected calf should first be isolated from the others and provided with a warm, dry shelter. Separate feeding buckets, which should be washed and scalded after every feed, should be used.

The calf should be starved for 24 hours, or, if it is weak, allowed whole milk diluted with equal parts of boiled water or lime water. Not more than two pints of this diluted milk should be allowed on the first day of treatment, and it should be divided into two or three feeds. The calf should be given 2 to 4oz. of castor oil or liquid paraffin and then given the following once daily:—

Bismuth carbonate ..	1 drachm
Brilliant green	½ grain
Lime water	2oz.
Water	4oz.

Good results are also obtained with certain of the sulphonamide group of drugs, particularly sulphamezathine, which is, however, obtainable only on a veterinary prescription.

On the second or third day of treatment the proportion of milk to water may be increased and the amount fed gradually raised, but care should be taken not to return the calf to a normal diet too hastily. Dosing the calf with 1 to 2oz. daily of a good brand of cod-liver oil is strongly recommended to ensure that the calf has an adequate supply of vitamin A, so essential for its resistance to disease.

Prevention

Prevention is even more important than treatment, and attention to this aspect of the trouble will give much more satisfactory results. Main points are:—

1. Care of the cow during pregnancy. It is important, especially during the later days of pregnancy, to see that the cow has ample nourishing feed, particularly in winter and early spring, when grass is low in vitamin A. By the provision of good-quality lucerne hay and silage the cow is enabled to build up its store of vitamins in the liver ready for the time when it comes into milk production. For the same reason the cow should be dried off at least two months before she is due to calve, as continued milking is a drain on vitamin reserves and results in the amount of vitamin A in the colostrum being lower than it should be.

2. Colostrum from the mother should be fed to the calf for at least five days.

3. The calf should be regularly and frequently fed and overfeeding should be avoided at all times. Milk should be fed three times daily for the first three weeks. The quantities should be measured and fed separately to each calf. If the milk is not fed as soon as the cow is milked, it should be heated to 102 degrees F. and then given to the calf immediately.

4. Feeding buckets should be carefully washed and scalded after each feed.

5. Warm, dry shelter should be provided for the calves. This is important, as undue exposure to cold and wet conditions lowers the calf's resistance to disease.

Calf Pneumonia

Cattle of all ages may be affected with pneumonia, but calves between the ages of three weeks and four months are particularly susceptible; after four months they are relatively resistant. The various organisms which may be responsible for outbreaks of calf pneumonia are normal inhabitants of the respiratory tract, just as *B. coli*, which is responsible for white scours, is normally present in the digestive tract. Therefore, if pneumonia develops, some factor must be operating which will favour the multiplication of those bacteria.

Predisposing Causes

Three main factors which will facilitate the setting up of disease by the causal bacteria are:—

1. Exposure to cold, which under average conditions of calf husbandry in this country is probably the commonest predisposing cause of pneumonia. Calves are tethered in a cold paddock or between buildings where they are exposed to cold draughts, with no provision for shelter. As a result their vitality is greatly impaired and their resistance to disease lowered.

2. Overcrowding and faulty hygiene are important factors where calves are housed or kept in pens.

3. Pneumonia frequently occurs in association with calf scours. In such cases the intestinal disorder is probably the primary disease and pneumonia a complication due to the lowered resistance of the calf.

Symptoms

The calf is first noticed to be dull and off its food, breathing rather rapidly, and having a thick, mucous discharge from the nostrils. It soon develops a cough and its temperature may be as high as 106 degrees F. As the disease progresses breathing becomes more difficult and grunting is noticeable. The calf loses condition rapidly, but as a rule lingers on for two or three weeks and sometimes longer before death occurs. When recovery takes place it is usually protracted and there is always the danger of a relapse months later. Most recovered cases remain stunted and unthrifty. The death-rate from pneumonia is higher among younger calves.

Treatment

Affected calves should be removed immediately from contact with other calves and placed in a warm, dry box or shed, free from draughts but with adequate ventilation. If calves are treated in the early stages of infection, good results are obtained by the administration of sulphapyridine, which can be obtained on a veterinary prescription. Little or no benefit is obtained from the use of medicated inhalations or the application of mustard to the chest wall.

Prevention

If steps are taken to avoid the predisposing causes enumerated above and in the section on calf scours, and the resistance of the calves is maintained by careful attention to feeding and if necessary the daily administration of cod-liver oil, outbreaks of pneumonia in calves are likely to be rare.

Indigestion Due to Foreign Bodies

The foreign body in the stomach causing indigestion is usually a hair ball, which may result from the calf's licking itself or its dam or possibly other calves. Sometimes the cause of the trouble may be a piece of baling string, bedding, or even sand.

Symptoms

Symptoms may be very acute, with the sudden development of abdominal pain and convulsions, and death may occur in a few hours. In less severe cases there may be recurrent indigestion, the calf being off its food, dull and listless, and showing signs of abdominal pain, such as kicking at its abdomen and restlessness. The calf may become slightly blown, with periods of temporary improvement. At first there is constipation, which is soon followed by a blackish, slimy diarrhoea.

Treatment

The condition is a difficult one for the farmer to diagnose with certainty, and in any case medicinal treatment is useless. Surgical removal of the foreign body gives good results, provided the operation is undertaken early.

Prevention

Much can be done to prevent this condition, as the natural tendency of calves to lick and swallow foreign objects is aggravated by bad feeding and management. Irritating skin diseases such as lousiness encourage licking, while mineral deficiencies and the absence of a suitable roughage at the age when the calf starts to chew the cud will favour the swallowing of coarse straw, string, wood, or other objects. Calves should be provided with good-quality hay and fresh, clean water, and baling string and other rubbish should be removed from the calf paddock.

Calf Diphtheria

Diphtheria is an infectious disease of calves caused by a specific organism called *Fusiformis necrophorus*. It may affect calves from a few days old up to four months, but very rarely older calves.

Symptoms

Usually the first sign is some dribbling from the mouth and the

CONTROL AND TREATMENT OF CALF DISEASES . . .

calf's refusal of food. Swallowing movements may be noticed and sometimes there is a swelling of the cheek or in the region of the throat. The calf is dull and depressed and may have a high temperature; it soon becomes thin and weak.

During examination of the mouth an objectionable smell is evident. Greyish-yellow necrotic ulcers are present on the lining membrane of the mouth, either on the inside of the cheek adjacent to the molar teeth or on the sides or base of the tongue. Sometimes ulcers are found on the gums around the incisor teeth and occasionally further back in the region of the throat.

Young calves may die in three to five days, while older calves may survive for several weeks and eventually die from pneumonia. Mild cases some times recover spontaneously.

Treatment

Although the disease does not spread rapidly from one calf to another, it is nevertheless infectious, and affected calves should be isolated at once. Healthy calves should be examined daily for the earliest signs of the disease. Necrotic areas in the mouth should be swabbed with Lugol's solution of iodine or a 4 per cent. solution of boric acid. Administration of one of the sulphonamide drugs, sulphanilamide or sulphapyridine, is, however, the most effective treatment.

Redwater

Redwater disease attacks calves from one to eight weeks old in spring in dairying districts of the North Island. The affected calves are usually doing well and are running on quick-growing pasture and receiving whole or skim-milk with some meal concentrate. When very young calves are affected the milking cows are on similar pasture. The cause of the disease is not known.

Symptoms

In very acute cases calves may die suddenly without premonitory symptoms, but in less-acute cases weakness, staggering, and distressed breathing may be noticed. The urine of calves kept under observation may be seen to be discoloured, varying from bright red to port wine or even black in some cases. The lining membranes of the eyelids and mouth become very pale. Unless control measures are adopted without delay, losses from this disease may be up to 100 per cent.

Post-mortem examination reveals that the bladder contains dark-red urine, the kidneys may be swollen and dark, while the liver is pale yellow.

The discoloration of the urine is due to the breaking down of red blood corpuscles and the elimination of the red colouring matter (haemoglobin) by the kidneys. The destruction of the red corpuscles is probably caused by some unidentified toxic agent present in young, quick-growing pasture.

Treatment

Calves should be removed from pasture and milk and concentrates withheld for 24 hours. Affected calves should be kept warm and exercise restricted. Frequent drinks of barley water or oatmeal gruel may be given and the following drench administered:—

Common salt	..	1 tablespoonful
Turpentine	..	1 dessertspoonful
Milk ..	..	½ pint

Next day the calf may be allowed some milk diluted with an equal quantity of water and thereafter the proportion of milk each day should be gradually increased. A blood tonic is indicated to correct the severe anaemia and for this purpose ½oz. of citrate of iron and ammonia should be given daily in milk.

Prevention

Where there is rapid growth of grass in districts where the disease is liable to occur grazing on lush pastures and the feeding of concentrates should be restricted. A teaspoonful of common salt should be added to each milk feed for about a week and, where calves are old enough, some good-quality hay should be fed each day before calves are turned on to lush pasture.

Lead Poisoning

The usual cause of lead poisoning, which is fairly common in calves, is the licking and swallowing of lead paint. Although freshly-painted objects and discarded paint tins are the more obvious sources, poisoning very frequently results from calves' chewing objects on which the paint is old and obscured by dirt or whitewash. It must be emphasised that the source of lead can easily be overlooked, and in many cases where analysis has proved the existence of lead poisoning prolonged search has been necessary to discover the origin of the poison. Other possible sources of lead are orchards which have recently been sprayed with lead arsenate, old, disused car batteries, and lead water pipes when the water supply is soft.

Symptoms

Calves suffering from lead poisoning generally die quickly, but excitement, staggering, grinding of the teeth, and salivating are symptoms which might be observed in affected animals. There is abdominal pain and blindness and frequently severe constipation.

Diagnosis

Lead poisoning can be confirmed only by laboratory analysis. For this purpose 1lb. of liver and 1lb. of fourth stomach contents, both specimens unpreserved, are required.

Treatment

The most effective antidote is Epsom-salt, 2 to 4oz. in water, followed by a pint of medicinal paraffin, which should be repeated daily. The calf should be allowed a liberal diet of milk while under treatment.

Ringworm

Ringworm is a very common condition in calves which frequently disappears spontaneously in three or four months, but it sometimes becomes serious, especially if the calves are under-nourished. The scabs are usually present on the face, eyelids, head, and neck, and sometimes on the body, but rarely on the legs. They are round and vary in size from that of a threepenny piece to the size of a half-crown or even larger where the lesions are numerous and run together.

Treatment

The fungus which causes ringworm is readily killed by disinfectants, but first of all the scabs should be softened with a solution of washing soda and then removed with a scrubbing brush. Any of the following applications may then be applied:—

1. Tincture of iodine.
2. Salicylic acid 1 part; lard or petrolatum 10 parts (by weight).
3. Sulphur 1 part; kerosene 1 part; petrolatum 3 parts (by weight).
4. Phenyl mercuric iodide 1 part; lard or petrolatum 100 parts (by weight).

The treatment should be repeated twice weekly. After handling affected calves the hands and arms should be washed in an antiseptic solution.

HANDBOOK OF MECHANICAL MILKING

EVERYONE who owns or operates a milking machine should have a copy of the Department of Agriculture's "Handbook of Mechanical Milking" (Bulletin No. 260). Written by W. G. Whittleston, of the Animal Research Station, Ruakura, a research worker of considerable repute overseas, it deals exhaustively but interestingly with the subject, giving a short history of the invention of such machines and chapters on milking problems, vacuum pumps, pulsators, relief valves, vacuum gauges, testing devices, rubberware, hints on running a machine, and the setting up of a new machine. The conclusions he reaches about the most efficient lay-out and type of machine will be of particular interest to anyone contemplating the purchase of a new milking plant. The bulletin is available free from any office of the Department of Agriculture.

Pig Broadcasts

UNDER the auspices of District Pig Councils broadcasts will be delivered in October as under:—

Auckland—1YA, on October 26, at 12.35 p.m., "How can we Breed More Profitable Pigs?" by H. Preston, Supervisor, Northland District Pig Council.

Napier—2YH, on October 14, at 7.15 p.m., "The Value of Pasture for Pigs," by H. Hopkins, Supervisor, Tairawhiti District Pig Council.

Palmerston North—2ZA, on October 15, at 7 p.m., "The Man at the Gun" (management), by L. L. Marsdon, Supervisor, Wellington District Pig Council.

Burning of Montane Tussock Grassland

WHAT happens when burning of tussock grassland is carried out at what is thought to be a very suitable season is considered in this article. At times, because of various causes, burning may be carried out at other seasons and the results may be very different. About the burning of tussock grassland, as about other phases of high-country tussock grassland farming, there is a variety of opinions, but the recorded results of careful observations and measurements which follow confirm the opinions of experienced, practical men.

By T. G. SEWELL,
Assistant Instructor in Agriculture, Christchurch.

TUSSOCK grassland, the native grassland of New Zealand, occupies some 14,000,000 acres, about 13,000,000 of which are in the South Island. Originally tussock grassland occupied most of the land on the eastern side of the Southern Alps to the coast and has been broadly classified (5) as follows:—

0 to 1000ft.: Lowland tussock grassland.
1000 to 3000ft.: Montane tussock grassland.
3000 to 5000ft.: Sub-alpine tall tussock grassland.
Above 5000ft.: Alpine vegetation.

Most of the lowland tussock grassland has been cultivated and sown to pastures or to crops, but the montane and sub-alpine tussock grasslands and alpine areas remain more or less in their original form, modified by grazing and burning.

Montane tussock grassland occupies an area of some 6,000,000 acres, or approximately one-seventh of the occupied land of New Zealand, and extends from the average limit of the heavy western rainfall forest to the cultivated pastures of the foothills and plains. From Marlborough to Southland on the eastern side of the Southern Alps montane tussock grassland stretches in an almost unbroken belt, interrupted here and there by forest, mainly of southern beech.

Extending for almost the length of the island through great intermontane basins of the mountainous regions, montane tussock grassland experiences a wide range of rainfall, which has been classified (7) as follows:—

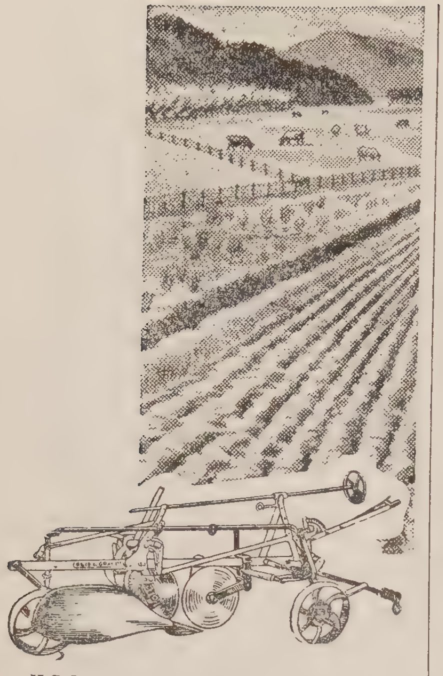
High-rainfall areas, 50 to 200in.: characteristic of the headwaters of the main rivers.
Medium or moderate-rainfall areas, 35 to 50in.: the Waimakariri and Rakaia run country.
Low-rainfall areas, less than 35in.: Mackenzie Country and Central Otago.

Utilisation

Montane tussock grassland provides a natural pasturage for flocks of high-country runs, most of which also have available sub-alpine or alpine areas where sheep graze during summer. However, carrying capacity of high-country runs in the montane belt is determined by the relatively snow-free country during winter.

Montane tussock grassland is one of the few natural resources of New Zealand that have remained a permanent asset without having to be modified to render them capable of continued production. It has been estimated that it carries approximately two million sheep, which provide a valuable supply of fine wool as well as store sheep for down-country farmers.

Above—Winter country in the montane tussock grassland of the Waimakariri River basin.



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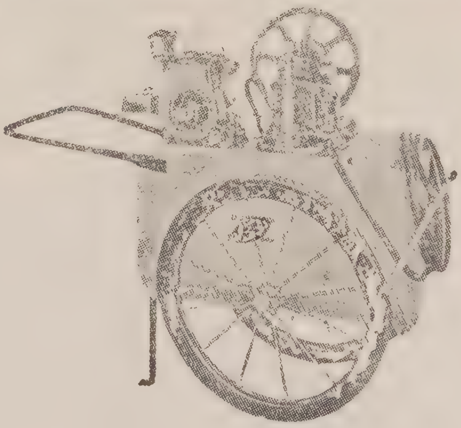

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Summer country in the sub-alpine tussock grassland is thickly covered with snow in winter.

There has been much discussion, based on visual evidence, of its decline in carrying capacity, and more recently it has been the subject of debate in relation to soil erosion, but detailed information about growth and behaviour of the principal plants under farming practices in this area has been lacking.

In early times burning took place at all seasons of the year, but today it is confined mostly to early spring. The practice of burning has been condemned as being chiefly responsible, with overstocking by sheep and rabbit infestation, for deterioration on montane tussock grassland.

No judgment is passed in this article on the practice of burning, but the results of experiments which included the measurement of the growth of the chief tussocks after burning are recorded, which fundamental information enables conclusions to be drawn on the effect of burning on the behaviour of the vegetation.

Topography

The region of the Southern Alps through which montane tussock grassland extends consists of large intermontane basins separated by jagged, folded mountains rising to an altitude of between 5000 and 8000ft. or more, the higher ranges occurring nearer to the main divide on the west and the lower ranges on the eastern side separating the montane tussock grasslands from the plains near the coast.

The broken nature of the country with its irregularly-placed mountain ranges and basins causes wide variation in climate. Rainfall varies enormously and snowfalls are frequently quite local. The way the country lies to the sun and wind also affects materially the length of time snow lies on the ground. This is not a factor requiring consideration in other branches of farming. The best type of high country is steep and clears rapidly from snow; on flat, undulating, or gently-rolling country snow lies too long.

Because of the variable nature of the country the conclusions drawn in this article cannot be applied broadly to the whole extent of montane tussock grassland. Experimental work was conducted in the vicinity of Cass and Craigieburn in the Waimakariri River basin because of its ease of access for frequent observations, and the results and conclusions drawn refer to this area of moderate rainfall where rabbits are practically non-existent.

Climate

The neighbourhood of Cass and Craigieburn lies just beyond the influence of the heavy western rainfall. The annual precipitation varies from 50in. at Grasmere Station (altitude about 2000ft.) to 36in. at Craigieburn (altitude about 1500ft.) and has a fairly even distribution throughout the year, the driest period occurring in March.

Observations were made during the spring, summer, and autumn of 1946-47. The summer and autumn were notable for their dryness, the area receiving only about two-fifths of its normal rainfall.

The prevailing wind comes from the north-west heavily laden with moisture from over the Tasman Sea, strikes the Southern Alps, where most precipitation occurs, and sweeps through the montane regions and over the Canterbury Plains as the well-known Canterbury nor'-wester.

Of the vicinity of Cass and Craigieburn Foweraker (8) states, "the wind is moderately dry, usually cold, and blows with very considerable force, occurring most frequently in the spring, summer, and autumn." The effect of these winds had previously been recorded by Dr. L. Cockayne in his early writings on ecology (4). "The prevalence of strong, desiccating winds renders less effective the available rainfall and in consequence leads to the development of xerophilous (drought-resistant) growth forms which can effectively withstand the mechanical action of the winds and excessive transpiration."

Snow falls frequently during winter, but does not lie for longer than a week. It occurs more frequently at higher altitudes. Most falls occur during winter, but over a period of years they have been known in all months of the year.

Severe frosts of up to 30 degrees occur during winter and slight frosts may occur in summer.

Soils

The soils in the vicinity of Cass and Craigieburn are derived from greywacke, and under the moderate rainfall on the western side of the intermontane basins Kaikoura soils predominate. On the ranges bordering the dry intermontane basins Kaikoura soils occur at altitudes between 3000ft. and 4000ft., but westward of the intermontane basins they descend to lower altitudes (1500ft.) under rainfalls of between 30in. and 75in.

In their bulletin on soil erosion in the high country of the South Island Raeside and Gibbs (10) state, "at the time of settlement the vegetation of the Kaikoura soils was mainly tall tussock grassland. On the mountain slopes the boundary between the tall tussock and low tussock grassland corresponds approximately with the soil boundary between the Kaikoura and Omarama soils." The lower limit of the Kaikoura soils corresponds approximately with the lower limit of the normal winter snow line. "At present over practically all of these soils only stunted remnants of the tall tussocks remain, and the areas are either bare or have been invaded by fescue tussock and species of *Celmisia, Cassinia, Pimelia, Acaena, Leucopogon*, and *Agrostis*, which, however, form a very sparse cover of vegetation."

The area under observation is on the westward side of the Waimakariri River basin, under a moderate rainfall, at an altitude of about 2000ft., and where Kaikoura soils predominate. These soils are low in lime content and are formed on the rolling and terrace country from morainic, alluvial, or wind-blown material. They are of a sandy texture and are strongly leached.

Observations on burning were made on Kaikoura soils of rolling and flat phases and results refer to this soil type.

Vegetation

For 90 years the vegetation in the vicinity of Cass and Craigieburn has been subject to the modifying influence of man and grazing animals. Except where it is relieved by the presence of introduced plants, the dull-brown colour of montane tussock grassland in this area of moderate rainfall generally has a monotonous appearance, due to the apparently unchanged dominance of the tussock growth form. In most cases fescue or hard tussock (*Festuca novae-zelandiae*) is the dominant species, but in certain instances other plants of a similar growth form are locally more important, typical examples being red rush (*Schoenus pauciflorus*), which occurs in boggy places, red tussock (*Danthonia Raoulia* var. *rubra*), which occurs in sour, boggy places and is often dominant over the red rush, and silver tussock (*Poa caespitosa*), which occurs in damp and possibly more fertile localities, such as in gullies or streamlet beds.

On recently-stabilised shingle fans matagouri or wild Irishman (*Discaria toumatou*) is dominant, and in other localities manuka (*Leptospermum scoparium*) and tauhinu (*Cassinia fulvida*) thickets are the dominant forms.

In certain areas the dominance assumed by blue tussock (*Poa Colensoi*), which forms colonies, may have been caused through the practice of burning.

The dominant fescue tussock is a closely-bunched grass about 12 to 24in. high. It forms a mulch of dead leaves for moisture conservation and affords protection from drying winds for lower-growing grasses and herbs. Its sheltering influence and moisture conservation provide a microclimate—

A general view of the burnt area studied to procure the data on which the conclusions in this article were based.

that is, the conditions among the tussocks are damper and more humid than on bare areas exposed to the sun and wind—in which more succulent and palatable species can grow.

Before settlement the tussocks probably were larger and the aforementioned microclimate more extensive. Probably many of the species now occurring sparingly were present in far greater numbers. It is likely that as a result of burning the size of the tussocks has been reduced and the nutritious grasses and herbs between them and at their base have become more accessible to stock. Reduced protection and the effect of grazing have in some instances almost eliminated the very palatable species.

Today the native grasses sensitive to grazing grow only in the protection of the tussocks, while those with a twitch habit, such as mountain twitch (*Triodia exigua*), persist in open communities. This reduction in the number of palatable species has been offset by the establishment of certain introduced species, namely catsear (*Hypochoeris radicata*), sweet vernal (*Anthoxanthum odoratum*), browntop (*Agrostis tenuis*), suckling clover (*Trifolium dubium*), and Yorkshire fog (*Holcus lanatus*), which occur frequently and provide grazing for stock.

The principal grasses apart from the main fescue and blue tussocks and those enumerated above are the native grasses (*Danthonia* spp.), blue grass (*Agropyron scabrum*), and *Triodia pumila, Triodia Thomsonii*, and *Triodia exigua*, which occur between or at the base of fescue tussocks. Other native grasses such as plume grass (*Dichelachne crinita*), *Deyeuxia avenoides*, and *Deyeuxia Forsteri* generally grow within the tussocks and are inaccessible to stock.

In this close view of the unburnt area can be seen the accumulation of dead material which provides round the fescue tussock plants humus and protection for the germination of seeds.

How tussock grassland has survived the presence of man and grazing animals is shown by A. H. Cockayne, who wrote, "It is generally said that the effect of stock has been to reduce very largely what runholders call 'the better and finer grasses.' If a certain portion of the original vegetation has been more or less eliminated, the remarkable feature of the present-day montane tussock grassland in areas of moderate rainfall is that the dominant growth form has remained permanently the same in spite of grazing and burning."

Locality

The area studied was part of a burn on a shady face on the northern side of the west coast railway line to the west of Mt. Gog. It receives the sun during the summer from late morning to evening and is swept by the prevailing north-west winds.

TABLE I—MEAN MEASUREMENTS AND ESTIMATIONS MADE ON BURNT FESCUE TUSSOCKS

Date of observation	Locality	Mean height of butt in.	Mean height of tallest leaf in.	Number of seed heads	Percentage dead	Number of samples
November 16	Shingle fan	2.5	7	—	Not recorded	4
	Damp locality	—	—	—		—
	Hill	3	7.5	—		3
December 6	Shingle fan	2.5	6	—	Not recorded	7
	Damp locality	5	9	—		6
	Hill	2.5	4.5	—		10
February 5	Shingle fan	2.5	7	1 on 1 plant	Not recorded	13
	Damp locality	4	10	5 plants with total 13		10
	Hill	3	7	2 plants with total 16		13
May 2	Shingle fan	2	8	1 plant with 1 seed head	57	15
	Damp locality	3.5	9.5	4 plants with total 18	25	8
	Hill	2	7	Nil	84	8

The area included a rolling to flat consolidated shingle fan of dominant fescue and blue tussocks; a damp area at the head of the fan, where a small stream flowed out of the gully, of dominant silver and fescue tussocks; and a moderately-steep slope with a tendency to run to shingle of dominant fescue and blue tussocks.

The burn occurred early in September, 1946, as part of the normal grassland management, and the area was observed at intervals throughout the growing season in November and December, 1946, and February and May, 1947.

Method

Observations were made by walking over the area and at 10-pace intervals taking the following data from the tussocks nearest the toe of the boot:—

1. The height of the burnt butts.
2. The height of the tallest green leaves.
3. A count of the number of seed heads.

The evidence of grazing was noted and at the last observation the percentage of each tussock which had

TABLE II—MEAN MEASUREMENTS AND ESTIMATIONS MADE ON BURNT BLUE TUSSOCKS

Date of observation	Locality	Mean height of butt in.	Mean height of tallest leaf in.	Number of seed heads	Percentage dead	Number of samples
November 16	Shingle fan	2.5	5	—	Not recorded	5
	Hill	4	6.5	—		1
December 6	Shingle fan	2.5	5	—	Not recorded	9
	Hill	3	5	—		6
February 5	Shingle fan	2.5	5	4	Not recorded	12
	Hill	2.5	5.5	3 plants with seed heads		6
May 2	Shingle fan	2.5	5	7	15	15
	Hill	3	6	6	23	6

died as a result of burning was estimated. Approximately similar routes were traversed during each observation.

In addition to observations on burning, individual plant studies were being conducted at the same time in four localities covering about 8 miles of country in the vicinity of Cass and Craigieburn. Comparisons made later in the text refer to results of growth studies of 15 typical fescue tussocks, 8 typical blue tussocks, and 16 typical plants of sweet vernal. These plants were marked with numbered pegs and measured at fortnightly intervals from mid-September of 1946 until June of 1947. Average measurements were computed to show the growth of typical plants throughout the season. Similarly by collecting seed heads from plants in the vicinity of the pegged plants seed counts and germination tests were made to compute the number of viable seeds produced per plant.

Results

(a) **Fescue tussock** (*Festuca novae-zelandiae*): Table I on the previous page shows the mean measurements and estimations made on burnt fescue tussocks.

The height of burnt tussocks varied in different localities, the mean height of those measured in the drier shingle fan and hill localities being about 2½in., while the height of those in the damp locality was about 4in. The burnt butts were cone-shaped and taller in the damp than in the shingle fan and hill localities, where burning appeared to go deeper into the crowns of the tussocks.

Leaves reached a mean maximum height of approximately 8in. in the shingle fan, 10in. in the damp, and 7in. in the hill localities. The fresh growth from typical unburnt fescue tussocks was 18½in., while the old season's leaves increased by 2in. from 16½in. to 18½in. Thus burnt tussocks produced only about half the growth of typical unburnt tussocks, and their leaves also tended to be spindly and grew either from the highest portion of the burnt crowns or from the perimeter of the tussocks.

More growth occurred in the damp locality, where butts were taller, than in either the shingle fan or hill localities. There tended to be least growth on the hill locality.

The new leaves of the tussocks were grazed by sheep up to December. Further grazing in February occurred only in the damp locality.

Most of the burnt tussocks did not produce seed heads, but typical unburnt plants produced 25 seed heads.

It was estimated in May that about 50 per cent., 25 per cent., and 80 per cent. of each tussock observed in the shingle fan, damp, and hill localities respectively had died through burning, which indicates that the effect of burning is more severe in dry shingle fan and hill localities than in damp localities.

(b) **Blue Tussock** (*Poa Colensoi*): Table II above shows mean measurements and estimations made on burnt blue tussocks.

The butts of burnt tussocks were approximately 2½in. high in both the shingle fan and hill localities. The mean maximum height of the leaves was about 5in., about two-thirds of the average fresh growth of 7½in. of typical unburnt blue tussocks. Growth was evenly distributed over the tussocks and by December, three months after burning, there was little evidence of the burn.

The new leaves were apparently scarcely eaten by sheep. Some evidence of grazing was noted in February.

Most of the tussocks produced 6 seed heads, though typical unburnt plants produced 15. This is in contrast to burnt fescue tussocks, which did not generally produce seed heads. It was estimated that the percentage of each tussock which had died as a result of burning was approximately 15 and 25 on the shingle fan and hill localities respectively, the effect of burning apparently being more severe on the hill locality.

(c) **Silver tussock** (*Poa caespitosa*): Table III below shows mean measurements and estimations made on burnt silver tussocks.

The burnt butts were approximately 4in. high and were cone-shaped. The average height of the tallest leaves was about 9in., compared with the 25in. of fresh growth of unburnt tussocks. Growth was evenly distributed over the burnt butts and was more vigorous than that of fescue tussocks.

Most of the tussocks produced approximately 6 seed heads, compared with over 100 produced by typical unburnt tussocks.

It was estimated that about 25 per cent. of each tussock had died as a result of the burn.

For comparative purposes two typical silver tussocks were pegged in a similar locality and observed throughout the growing season at the same time as other individual plants. Silver tussock occurs only in the more fertile localities, and is a minor constituent of the plant community in the vicinity of Cass and Craigieburn.

Analysis of Observations

It was apparent a week after the burn that as the fire swept over the grassland it burnt the taller and more open fescue tussocks and dead material at their bases and burnt deeply into the crowns of tussocks fairly widely spaced and growing on well-drained land, such as on hilly slopes. Where tussocks were growing closer together in damp localities and their butts were moist the fire burnt the drier tops and left taller butts. This also happened to silver tussock, which grew only in the damp locality.

Blue tussock, however, has a dense, tufted growth form and is protected by a covering of dead leaves. As it is low growing and was probably damp, the fire apparently swept over it and merely singed the tips of the leaves.

During the November and December observations sheep which were watched grazing the area greedily ate the new green leaves of fescue and silver tussocks, apparently in preference to the grasses and herbs between the tussocks, but did not seem to favour blue tussock.

What effect burning has on the germination of seeds produced from burnt tussocks and the length of time tussock seeds will remain in the ground and still germinate are not known. However, if the number of seed heads is an indication of the effect of burning on tussocks and their re-establishment from seed, it is likely that repeated burning not only partly kills the tussocks, but also reduces the production of seed, and that the net result

TABLE III—MEAN MEASUREMENTS AND ESTIMATIONS MADE ON BURNT SILVER TUSSOCKS

Date of observation	Locality	Mean height of butt in.	Mean height of tallest leaf in.	Number of seed heads	Percentage dead	Number of samples
November 16	Damp locality	7	13	—	Not recorded	1
December 6	Damp locality	4.5	9	—	Not recorded	13
February 5	Damp locality	3.5	9.5	6	Not recorded	13
May 2	Damp locality	3	9	4	27	8

will be the extinction of the tussocks. Fescue tussocks appear to be the most susceptible to burning and produce very little seed, but most of the blue and silver tussocks produce some seed and some re-establishment may occur.

Blue tussock was the least affected by burning. It produced seed heads and its vigour was not greatly affected compared with fescue tussock, which suffered a severe check in growth. This supports the view that the presence of much blue tussock in the vicinity of Cass could be attributed to burning (3).

Seed counts and germination tests have shown that typical fescue and blue tussocks in this area produce respectively some 200 and 50 viable seeds per plant, and a number of seedlings should therefore be found growing in the field. However, observations indicated that seeds germinate only in the protection of tussocks, where there is an accumulation of dead matter and humus. Frost lift occurs even under the protection of the tussocks and dead matter, but though the moist humus is lifted, the seedling, being embedded in it, is lifted too and survives. No seedlings were found growing on the windward side of tussocks exposed to sun, frost, and wind.

Measurements of tussock growth rate have shown that they increase in size only slowly. It is probable, therefore, that dead matter necessary for the formation of humus and for the establishment of seedlings accumulates slowly. The fescue tussock by its sheltering influence and mulch of dead leaves produces a microclimate in which the palatable grasses which provide the principal grazing for sheep grow. Burning removes this sheltering influence and accumulated dead material and reduces the production of seed.

A close view of the burnt area immediately above the area shown on page 267. Destruction of the dead matter and exposure of the bare ground by burning are evident; also the absence of seed heads on the partially-dead burnt tussocks, compared with their presence in the previous illustration. Sweet vernal is growing between the tussocks.

Thus it may be two or more years before the microclimate has redeveloped suitably for the germination and establishment of native species, though the introduced sweet vernal may establish earlier, as it is an earlier seeder and hence can establish before winter and is more resistant to frost lift. This supports the opinion that sweet vernal is increasing in the area under observation.

Conclusions

The following conclusions, which support the opinions of runholders, may be drawn from the experimental work described:—

1. Burning partly kills the tussocks.
2. It is more severe on fescue tussock in dry areas than in damp localities.
3. It is less severe on silver tussock, which usually grows in damp localities.
4. It is least severe on blue tussock.
5. Burning removes the protection of the old leaves and permits stock to graze on the new leaves.
6. It removes from the base of tussocks the dead material which forms humus and protection for the germination of seeds.
7. It reduces the growth of leaves.
8. It reduces the production of seed.
9. It is suggested that it may be two or more years before the microclimate redevelops suitably for the germination of seed.

References

1. Cockayne, A. H., "Burning Tussock Grassland," "New Zealand Journal of Agriculture," vol. 1, p. 1 (1910).

2. "Burning Practice on Tussock Grassland," Canterbury Chamber of Commerce Bulletin No. 189 (1945).

3. Cockayne, A. H., "Notes from the Canterbury College Mountain Biological Station, Cass: Some Economic Considerations Concerning Montane Tussock Grassland," Transactions of the New Zealand Institute, vol. 48, pp. 154-165 (1915).

4. Cockayne, L., "A Sketch of the Plant Geography of the Waimakariri River Basins Considered Chiefly from the Ecological Point of View," Transactions of the New Zealand Institute, vol. 32, pp. 95-136 (1899).

5. Cockayne, L., "New Zealand Plants and Their Story," Government Printer, Wellington (1927).

6. Cumberland, K. B., "Burning Tussock Grassland: a Geographic Survey," New Zealand Geographer, vol. 1, p. 149 (1945).

7. Dick, R. D., "Observations on Insect Life in Relation to Tussock Grassland Deterioration," New Zealand Journal of Science and Technology, vol. 22A, p. 19 (1940).

8. Foweraker, C. E., "Notes from the Canterbury College Mountain Biological Station, Cass: The Mat Plants and Cushion Plants and Allied Forms of the Cass River-bed," Transactions of the New Zealand Institute, vol. 49, p. 1 (1917).

9. Sewell, T. G., "A Study of Montane Tussock Grassland with Special Reference to the Growth, Seeding, and Behaviour of the Principal Tussocks and Grasses," unpublished thesis (1947).

10. Raeside, J. D., and Gibbs, H. S., "Soil Erosion in the High Country of the South Island," New Zealand Department of Scientific and Industrial Research, Bulletin No. 92 (1945).

Radio Broadcasts

RADIO talks to farmers will be given from Station 1YA Auckland at 7.15 p.m. on the following dates:—

October 4—"Current Farming Problems," by J. E. Davies, Instructor in Agriculture, Hamilton, and G. A. Blake, Instructor in Agriculture, Matamata.

October 11—"Nutritive Value of Pampas Grass," by L. R. Wallace, Chief Nutrition Officer, Ruakura Animal Research Station.

October 18—"Artificial Rearing of Chickens and Management," by H. A. Kitto, Poultry Instructor, Auckland.

October 25—Young Farmers' Clubs session, by a member of the Hauraki Y.F.C. district committee.

Other talks are given from 1YA Auckland on Tuesdays at 12.35 p.m., 2YA Wellington on Thursdays at 12.35 p.m., and 3YA Christchurch on Mondays at 12.35 p.m. and Thursdays at 7.15 p.m.

CARE OF LIVESTOCK DURING OCTOBER

By the Animal Research Division.

BLOOD POISONING AFTER SHEARING

DEATHS of sheep after shearing may be due to infection of cuts or bruises with the blackleg germ. This disease can be prevented by vaccinating at least three weeks before shearing. If deaths have occurred in previous years, a veterinarian should be consulted with a view to arranging for vaccination this year.

* * *

BLACK DISEASE VACCINATION

In east coast areas of the North Island where black disease of sheep occurs vaccination should be carried out during November or early December to protect against the disease, which occurs mainly in summer and autumn. Vaccine should be ordered immediately.

[*Photo News Ltd. photo.*

BLOWFLY STRIKE IN LAMBS

In districts where crutch strike causes trouble in ewe lambs crutching or early shearing is advised. Close supervision is necessary to detect cases so that suitable treatment can be applied before the strike becomes too extensive.

* * *

CATTLE TICK CONTROL

Where cattle ticks are plentiful spraying or dipping should be carried out in November and December to prevent tick worry and to kill the adult female ticks before they lay their eggs.

BLACKHEAD IN POULTRY

Blackhead disease, which affects young turkeys and poultry, can best be prevented by rearing the birds on land which has not been contaminated by adult poultry. If an outbreak occurs, affected birds should be killed and the remainder moved to clean ground, but if excessive numbers of a flock are affected, the local poultry adviser should be consulted, as in some cases treatment may prove beneficial.

* * *

GREENLEG IN BROODER CHICKENS

Greenleg disease occurs in poorly-ventilated brooders, especially if they are overcrowded and damp. At the first sign of trouble necessary measures should be taken to ensure that ventilation is adequate and that the litter is changed if it is at all damp.

[*Sparrow Industrial Pictures Ltd. photo.*

SPREAD OF WASP NUISANCE

Bounty for Queens and Issue of Powder for Nest Destruction

By C. R. PATERSON, *Apiary Instructor, Hamilton.*

SEVERAL seasons have now passed since wasps of the species *Vespa germanica* were first noticed in New Zealand in the Waikato district. As these wasps, which are of the common sort well known in England and European countries, have become a decided nuisance to farmers, housewives, orchardists, and beekeepers, it is desirable, in the public interest, to control them before infestation becomes wider spread. The success of the proposed control measures outlined in this article can be achieved only with the wholehearted co-operation of the public.

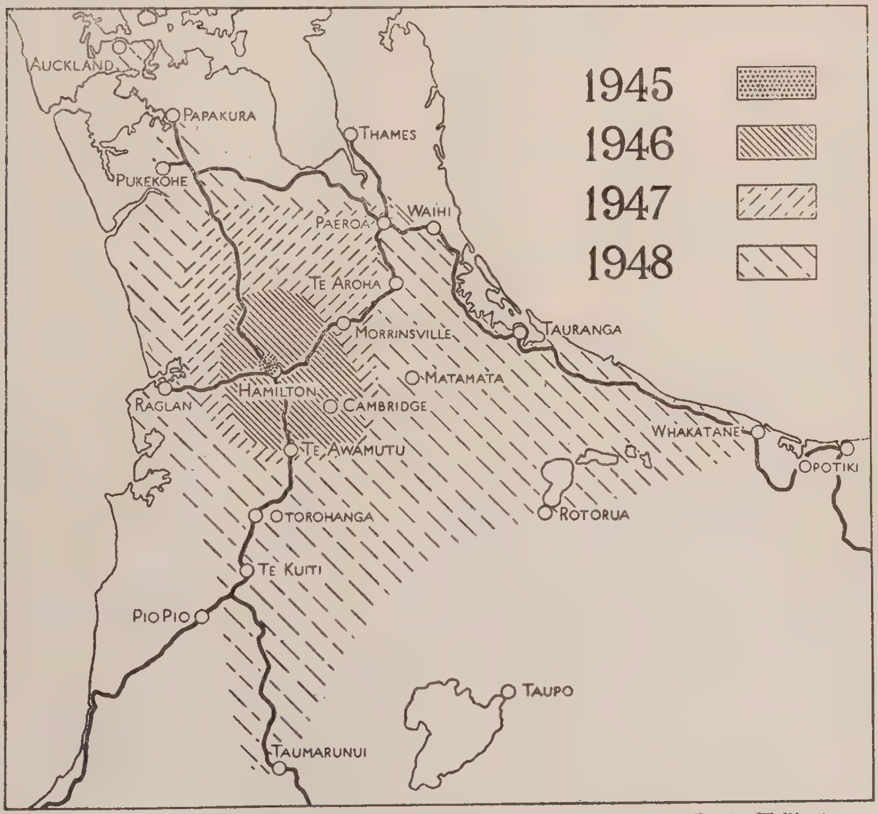
A queen wasp of the *Vespa germanica* species, showing the distinctive markings, which are black on a bright yellow body.

THE accompanying map and chart showing the increase and spread of infestation over the past few years indicate the need for greater activity on the part of the general public in destroying queens and established nests.

Life History

Young queen wasps of the species *Vespa germanica* and *Vespa vulgaris* are raised in the autumn, and after mating they hibernate singly or in groups in some dark, sheltered corner. With the exception of the newly-emerged young queens, all the community, including the old queen, die off in the autumn, and the old nest is abandoned.

In the spring the young queen awakens and immediately hunts for some suitable place (usually a cavity in a dry earth bank) to begin building her nest. These wasps protect their many tiers of brood cells by building a bag of several layers of fragile paper, made from wood pulp prepared by their own jaws and placed securely in position. Only a few cells made of the same papery material are built at first, and a single egg is laid in each. When these eggs hatch the resulting grubs are fed by the queen on a diet of masticated insects of all kinds, including flies and caterpillars, which she catches herself. As each grub grows the queen builds up the cell walls hexagonally and also begins other cells round them in which more eggs are deposited.



[*Map drawn by Head Office, Lands and Survey Dept., Wellington.*

Yearly spread of wasp infestation.

Worker Wasps Emerge

About 28 days after the first eggs are laid worker wasps emerge from the cells. The new arrivals enlarge the nest, build additional new combs, and extend the paper walls sufficiently to develop second and subsequent batches of larvae. Worker wasps develop in rapid succession, and soon the queen has a large army of assistants and is relieved of all her earlier duties except that of maternity. As the nest is enlarged the worker wasps excavate to provide adequate room. This work is done with their mandibles, and the bulk of the spoil is carried out and dumped well away from the entrance. All the new arrivals are workers (imperfect females) until late in the season or early autumn, when numbers of males and young queens are produced.

Throughout the spring and early summer they feed almost exclusively on other insects, but by January, when the nest has become well established, there are usually more workers than are necessary to maintain the normal economy of the nest. At this time, and until late in the autumn before the workers, males, and the old queen die, these wasps become a great nuisance to housewives, beekeepers, and orchardists because of their fondness for sweets, including jam and fruit juices.

Beehives receive considerable attention from these wasps and any weak colonies are likely to be slowly robbed of their honey. The wasps do not store honey or other sweets in their nests, as no food is required for consumption in winter. By May, when the young queens bred in the autumn leave the nest and fly away to hibernate, there is a decided slackening off in the activity of the wasps.

The outside paper covering of the ordinary wasp nest is light greyish. Nests may be located by watching the regular flight of the wasps in any particular direction, especially near ground level or toward the entrance to a hole in the ground. The sides of an earth bank where conditions are likely to be fairly dry are favoured for the building of their nests.

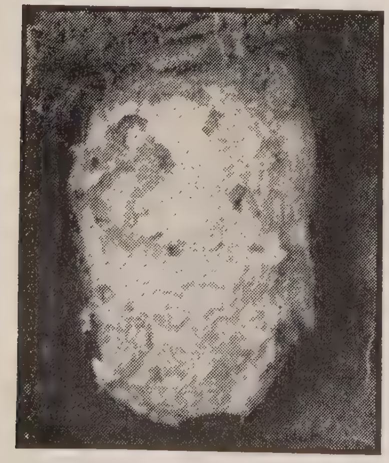
Unlike the honey bee, which dies once it loses its sting, the female wasp can sting repeatedly, and the pain is usually more severe than that from the sting of the honey bee. It is unfortunate that these insects have become established in New Zealand, and, though they are regarded in other countries as being more of a nuisance, it is desirable to control them before they become a major pest. That can be done only by the vigilance and prompt action of the public in locating their nests and by suitable arrangements for their destruction.

Tree Wasps (Polistes)

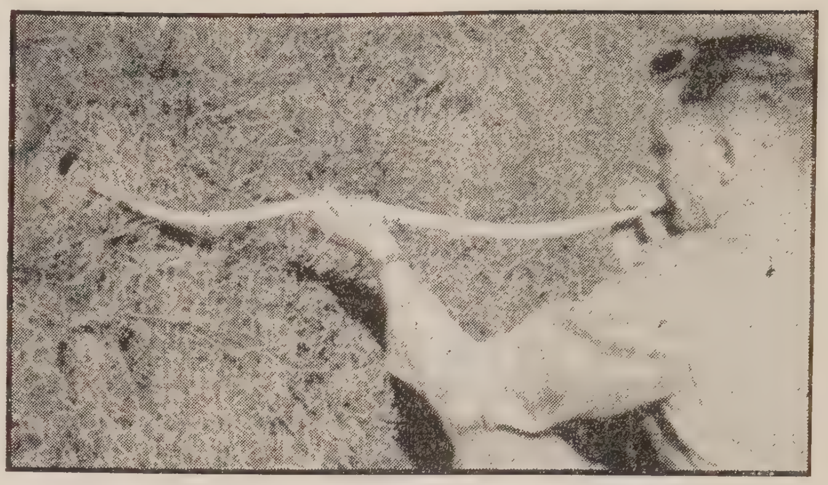
The comparatively small nests of tree wasps, an Australian species which is now fairly common in orchards in the Auckland and Wairarapa districts, can be more readily dealt with by orchardists and others to whom these wasps are a nuisance by burning them out with a torch or blow-lamp, or by snipping off the twig to which they are attached and dropping the complete nest into a tin half full of boiling water or water on which there is a heavy coating of kerosene.

Control Measures

In view of the life habits of these wasps it will be appreciated that every queen destroyed in the spring means an active nest less to be dealt with in the autumn. To encourage the maximum destruction of queen wasps it has been decided to pay a bounty of 3d. for each queen posted or delivered to the Department of Agriculture, P.O. Box 373, Hamilton.

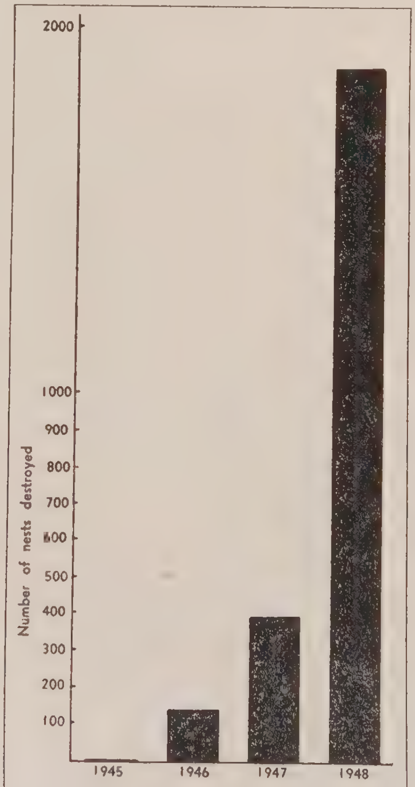


Wasp nest exposed by digging away a bank.



Chemical powder being blown into a wasp nest in a bank. To load the tube with the powder it is looped and the powder dropped into the end opposite that inserted into the mouth.

Queen wasps can be recognised by their larger size and the fact that they are the earliest wasps on the wing. A few workers and drones, which are smaller, have, however, been found on the wing during the past mild winter. Dormant queens may be found under cow covers, sacks, coats, hanging up in sheds, underneath the roofing of buildings, in cracks in logs, or under piles of stacked timber. They can be picked up in the hand, using a handkerchief as protection, and quickly placed in a tin or jar in which a little methylated spirits or kerosene has been placed.



Increase in the number of nests destroyed of the wasp species *Vespa germanica*.

The bounty on queens will be paid only up to the end of December, 1948. After this the public are asked to keep a close watch for any nests which may have become established. These can be destroyed by application of a chemical powder. Persons reporting nests to the Department of Agriculture, P.O. Box 373, Hamilton (telephone 3383 or 1952), will be supplied with a free issue of the powder with full instructions about its use. Part-time employees will be available to deal with any nests that cannot be destroyed by property owners.

The public's co-operation is urgently required to assist in checking the spread of this pest.

Wasp nest showing tiers of combs.

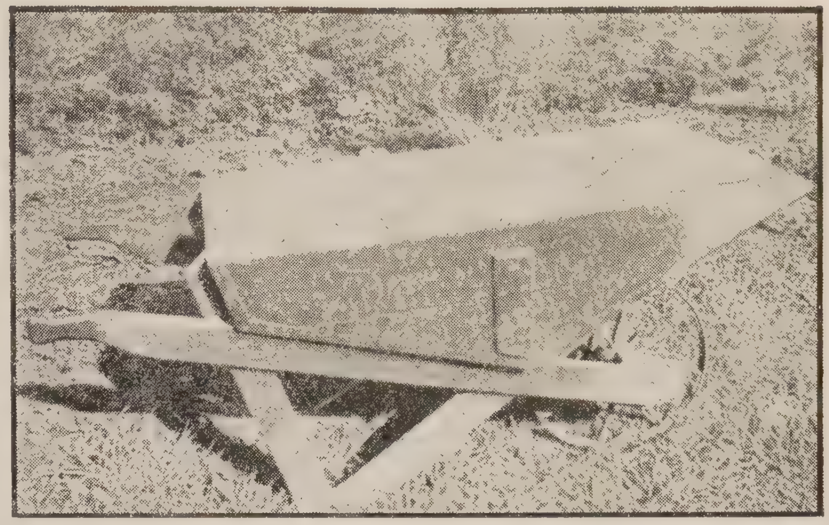
A Strong, Simply-constructed Wheelbarrow

AN article on the construction of a wheelbarrow in the December, 1947, "Journal" by C. Walker, Assistant Fields Superintendent, Palmerston North, prompted Mr. S. A. Nicholl, of Halswell, Christchurch, to forward this account of constructing a barrow. Mr. Nicholl considers that lack of suitable tools to do mortising may deter the amateur from attempting the conventional type of wheelbarrow, and he has therefore submitted details of a simplified design.

THE design requires no mortising or angle brackets and few bevelled edges. The barrow is very strongly made and has the advantage that it requires two sizes of timber only. Though different in appearance from the conventional barrow, this type is more useful in some respects and less convenient in only one.

The front is built high so that loads of loose materials do not pour over it when the barrow is lifted up to be wheeled. The high front makes side tipping more difficult, but front tipping is easier because the barrow will stand upright. The level top edge all round the barrow is very useful as a knee-high trestle for sawing timber.

The writer used Southland beech in constructing his barrow, which retains its original rigidity after weekend use for three years in a half-acre home garden. The design reproduced on page 274 embodies some improvements to the writer's barrow which have been suggested by use of the present model.



Materials Required

The materials required to make the wheelbarrow are as follows:—

Timber

Shafts: 3in. x 1¼in. dressed, 2 lengths 4ft. 6in.

Front transverses: 3in. x 1¼in. dressed, 2 lengths 3ft. 7½in.

Back transverses: 3in. x 1¼in. dressed, 2 lengths 2ft. ¾in.

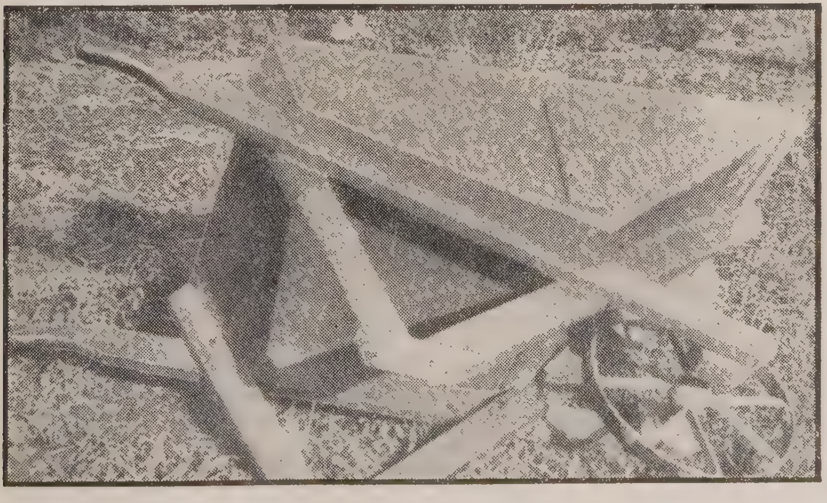
Front board: 3in. x 1¼in. dressed, 1 length 2ft. 3in.

Floor, front, and back: 6in. x 1in. dressed, 8 lengths 2ft. 3in.

Top sides (approximately): 6in. x 1in. dressed, 2 lengths 3ft. 2½in.

Bottom sides (approximately): 6in. x 1in. dressed, 2 lengths 2ft. 2½in.

Hardwood blocks for axles: 4in. x 3in. x 1¾in.



The barrow on its side, showing the iron shoe on the leg.

Bolts

Framing: 8 carriage, 3in. x 5/16in. or ⅜in.

Screws (countersunk)

Boarding: 3½ dozen, No. 8 x 2in.
Angle strips: 7 dozen, No. 6 x ½in.
Axle blocks: 8, No. 14 x 2in.

Angle Strips

16 gauge sheet metal 1in. x 1in., about 10ft. long.

Leg Shoes

Two pieces 16 gauge sheet metal 3½in. x 6½in.

Paint

Indian red: 1 quart.

Alternative Material

If the alternative method of joisting the sides is adopted, the following should be substituted for the angle strips and ½in. screws:—

Screws (countersunk): 3 dozen, No. 6 x 2in.
Nails: Several dozen 1¼in.
Beading: ¼in. or ⅝in. triangular, dressed; about 16ft.

Construction

Select the best pieces of 3in. x 1¼in. timber for shafts (the poorer timber can be used for the back legs) and having cut them to the lengths given, mark off the other dimensions, as shown in Fig. 1, along the top and inward edges. If the iron-shoe method is used, the foreleg can be cut square to meet the hind leg of the frame; otherwise both legs will have to be checked out as shown in Fig. 4.

The handles may be shaped where there is an adequate vice, but if one is not available, it is better to leave the handles until the barrow is completed.

Lay the members of one side together according to the markings; drill and bolt. Repeat with the remaining members, but be sure to put the legs on the outside of the shafts, as

A SIMPLY-CONSTRUCTED WHEELBARROW

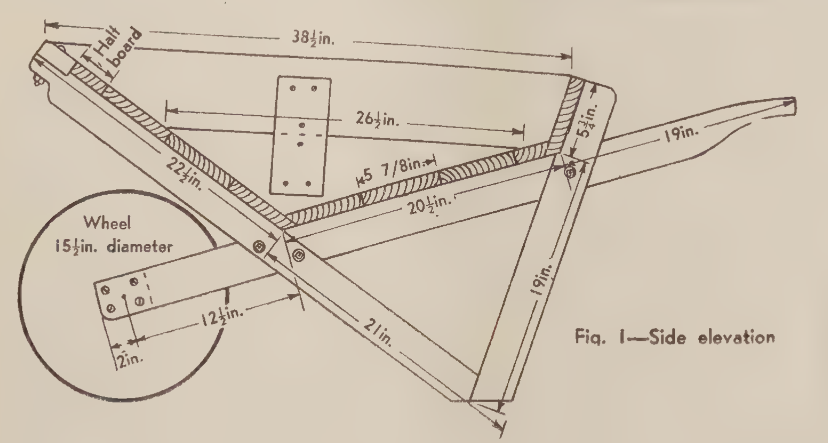


Fig. 1—Side elevation

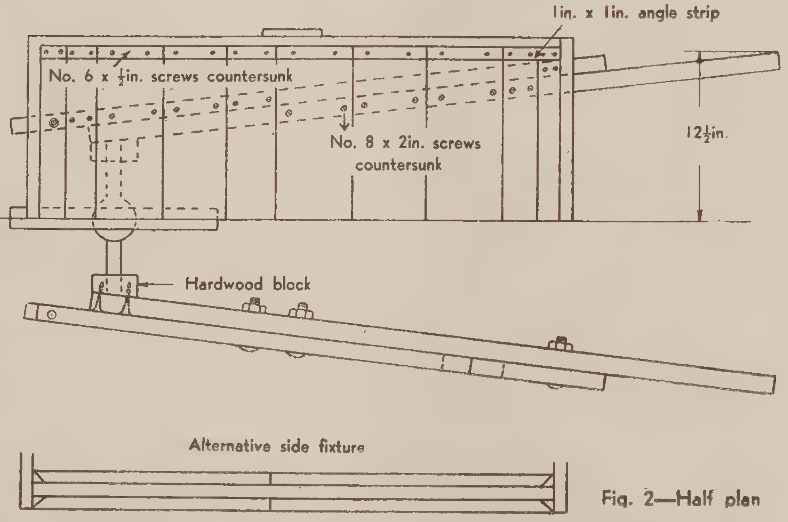
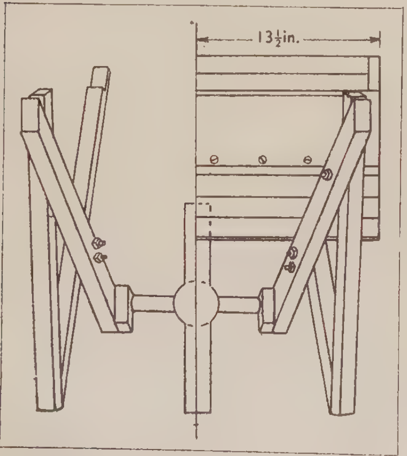


Fig. 2—Half plan



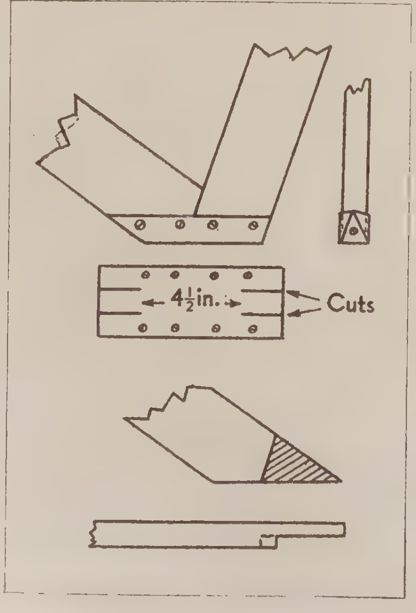


Fig. 3 (above)—Half-end view. Fig. 4 (right)—Alternative ways of joining the legs. Upper: The iron-shoe method, using a piece of 16 gauge steel 3½in. x 6½in. Lower: Checking out.

this will give a wider base for the barrow when it is being loaded.

Next, set up both frames on trestles or boxes, making sure that the tops of the trestles or boxes are dead level with each other. The front of the shafts can be set at a width to suit the axle, but be sure that the axle is equidistant on each side of the rim.

The handles can be set at a width not exceeding the width of barrow required. (A barrow 27in. wide can pass through a standard doorway.)

If a floor board is temporarily nailed or weighted down on the shafts so that the top edges are in full contact with it (i.e. the shafts are in a vertical plane), the amount of bevel to be cut out of the front and back frames can be marked off by holding another floor board against them and making a line parallel with the off edge. This portion can then be planed or chiselled off. (Note: The measurement of 20½in. of floor board in Fig. 1 does not take into account the slope of the shafts away from the centre line. The bevelling of the front and back legs or frame members will allow this measurement to be maintained when the shafts are set out at an angle. The object is to make three and a half widths of 6in. board sufficient for the flooring.)

Making the Floor

To make the floor it will be necessary to bevel the corner boards as shown in Fig. 1. They should be screwed into place. The intervening boards may be nailed if this economy is desired. The top front board should be as solid as the framing and bolted to it, as it has to meet the thrust of tipping.

It will be easier to fit the sides if they are kept vertical. This eliminates bevelling their edges and makes the barrow more suitable for carrying boxes. Begin the sides with the top board and mark off from the barrow as it stands, keeping the top edge level with the front and back edges. After being cut, the top board can be fixed temporarily while the lower side board is prepared in the same way as the top board.

The best method of joining the sides to the floor is by metal angle strips about 1/16in. thick having countersunk holes into which a No. 6 screw will fit neatly about 3in. apart down each side. These angle strips can be made from the bodywork of an old car. The metal can be cut on an iron block with a cold chisel and turned over in a vice or knocked into the angle of a wall and floor, or the angle pieces, already drilled, could be obtained from an engineering firm.

Alternatively, the sides could be set in about ½in. from the floor edge and screwed, and then buttressed inside and outside with ½in. beading. A batten or metal strip can be used to tie the two boards in the side together.

The drawing shows a wheel of 15½in. diameter. Hardwood blocks make excellent bearings. It is preferable to drill square into the blocks and then to cut one face to suit the angle of the shaft. Secure each block with four heavy-gauge screws or bolts.

Finally, the barrow should be painted, especially the handles.

The Two Forms of Coccidiosis in Poultry

[*National Publicity Studios photo.*

MOST poultry farmers are familiar with coccidiosis, which occurs in two forms, caecal coccidiosis affecting young chicks and duodenal coccidiosis occurring in growing birds from about three to six months of age. In this article A. C. Howse, Poultry Veterinary Officer, Wellington, describes the symptoms of the disease, preventive measures, and steps which should be taken if an outbreak occurs.

BOTH forms of the disease are caused by a small organism known as the coccidium, which is a minute living object consisting of a single cell. It is too small to be seen with the naked eye, but can be distinguished when magnified about 250 times by a microscope, and its internal structure can be seen quite clearly at about double this magnification. The coccidium belongs to the group of single-celled creatures which are the smallest and lowest forms in the animal kingdom. Some organisms in this group, certain of which cause disease in man and other animals, are able to move about, but the coccidia are incapable of movement. Though so small, they are considerably larger than the bacteria which cause diseases such as tuberculosis, pullorum, and fowl cholera. Most bacteria have to be magnified about 1000 times before they become visible. There are several species of coccidia, just as there are different species of birds or rabbits, and the two forms of the disease in poultry, caecal and duodenal coccidiosis, are caused by different species of the organism.

The Caecal Form

The symptoms of caecal coccidiosis are well known. Chicks from three weeks of age onward are highly susceptible, and it is in them that the disease frequently appears. They look miserable and dejected, chirp frequently, stand about under the hovers with ruffled feathers, and frequently pass blood-stained droppings. If untreated, large numbers of them die.

If chicks which have died of coccidiosis are examined post mortem, the caeca (the two blind sacs toward the end of the intestines) are frequently found to be distended with clotted blood or with yellowish, cheesy exudate. These symptoms and post-mortem appearances are caused by the activities of coccidia, which can be better understood from a brief account of the life cycle of the organism. The mature coccidium (known as an oocyst in this stage) is passed out in the droppings, where, after a period of development, it becomes infective and, if swallowed by a chick, will multiply inside the intestine and cause the disease known as coccidiosis. However, if it should be swallowed before a sufficiently-long interval has elapsed to enable it to develop to the infective stage, it will merely be digested and destroyed in the intestine of the chick without causing any trouble.

The interval required for development on the ground varies with conditions of moisture and temperature, but under the most favourable circumstances it is never less than 48 hours. Therefore, if all droppings are removed from the floors of brooders every 24 hours by routine cleaning out, or if chicks are reared on wire-mesh floors through which their droppings pass, they will not develop coccidiosis, as they will not swallow any fully-developed and infective oocysts.

If birds are kept under unhygienic conditions and infective coccidia or oocysts are swallowed, each multiplies within the intestine, and the resulting progeny enter the cells of the internal lining of the intestine. Further multiplication occurs there, causing great damage to the lining membrane of the inside of the intestine, resulting in hemorrhage, blood-stained droppings, diarrhoea, weakness, and in most cases death. In young chicks this damage occurs in the caecal sacs.

Duodenal Coccidiosis

The life cycle of the similar form of coccidium causing the duodenal or intestinal coccidiosis of older stock is the same except that the damage in this case occurs in the first part of the intestine after the gizzard. However, in this case also the oocyst requires a minimum period of 48 hours for development, after being passed out in the droppings, before it can cause infection again. Birds from three to six months old are affected, and the disease caused is of a slower, less acute form.

The death-rate is not as high as that from the caecal disease of chicks, but loss of condition, paleness of comb and wattles, and backwardness of growing

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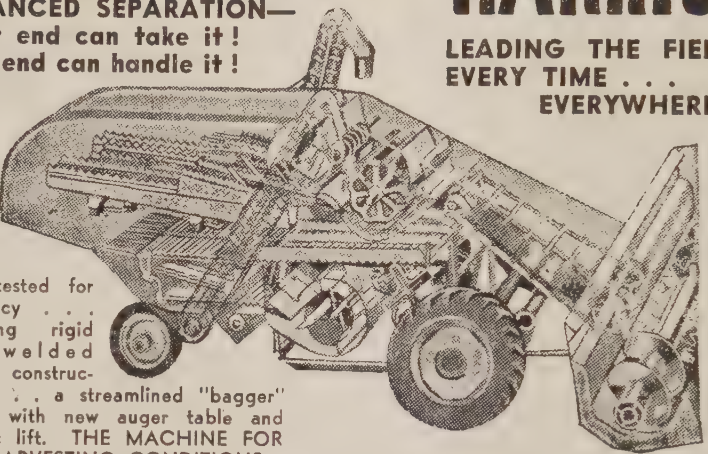

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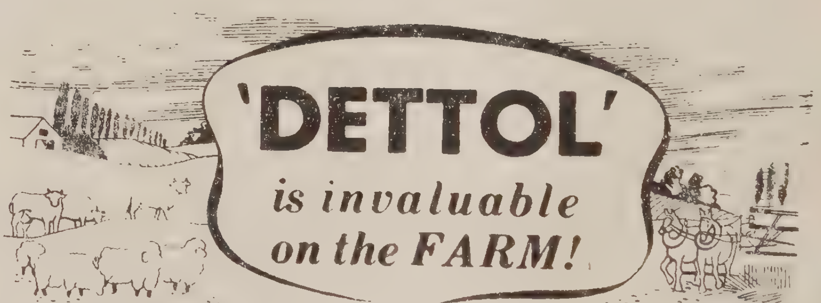

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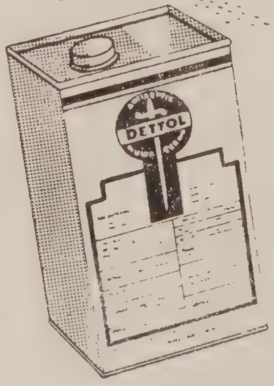

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stock are likely to result. In many cases pullets do not come into lay even at eight months of age or more, and large numbers of birds have to be culled. These effects are always more serious in birds of fundamentally-weak constitution and those kept under dirty and overcrowded conditions. If birds are suffering from round-worm infestation, green-food deficiency, or any other weakening condition, they are more likely to suffer from duodenal coccidiosis. In fact, good stock kept well are not usually affected, but the disease is always likely to occur when resistance is weakened by other causes.

Preventive Measures

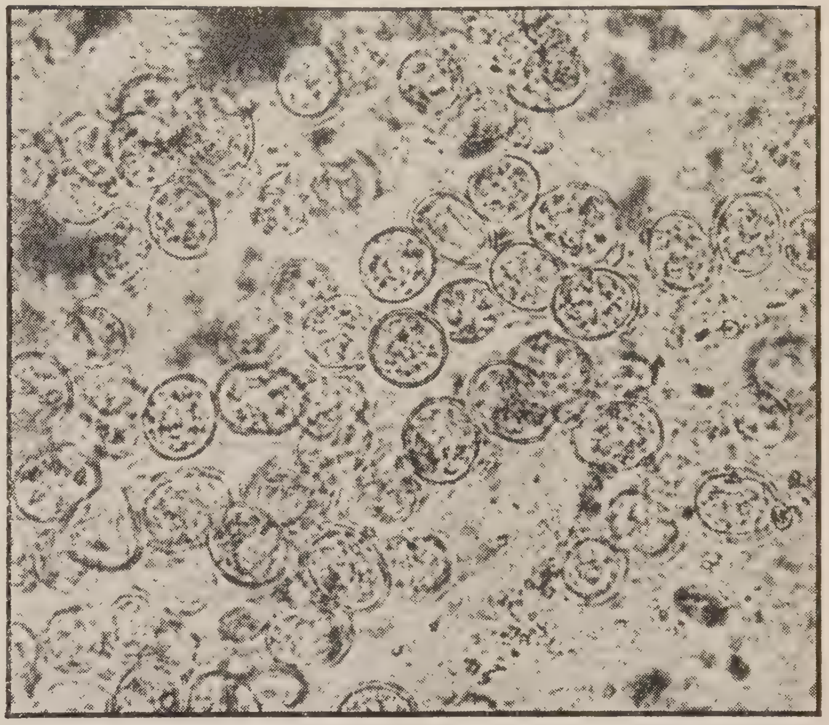
Prevention is better than cure with caecal and duodenal coccidiosis, as with all poultry diseases. Hygienic measures, such as keeping brooder-house floors clean and removing droppings at frequent intervals, should be adopted with chicks for both prevention and treatment. In addition floors should be kept dry, as coccidia develop more readily under damp, warm conditions. Food troughs and drinking vessels, if movable, should be shifted to a different part of the floor every day to avoid too heavy concentration of infection in any one place, as droppings are always thicker around these appliances. They should be constructed in such a way that chicks can neither get into them nor pass droppings in them.

If outside runs are used with brooders, the grass should always be kept short, if necessary by cutting or grazing with sheep or other animals. Coccidia are not very resistant to drying or the action of direct sunlight, and if the grass is always kept short, so that they are not shaded, this beneficial treatment will have full effect. Grass runs or brooder houses which are used for chick rearing should never be used to accommodate other poultry, which may carry coccidiosis and infect the ground, though showing no symptoms themselves.

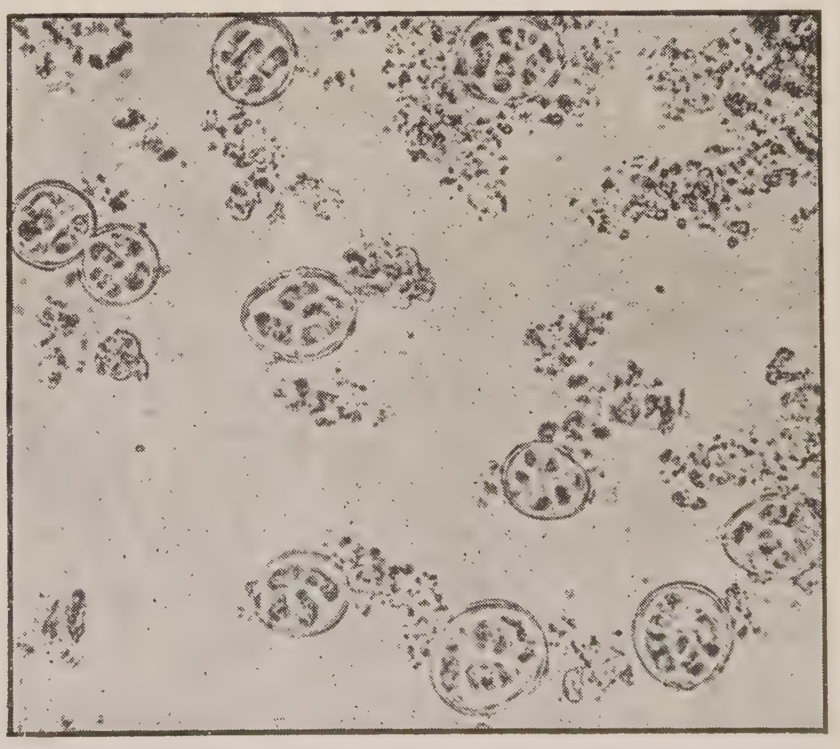
Sulphamezathine Treatment

If coccidiosis develops in chicks despite these precautions, it can now be treated effectively with sulphamezathine, which was discovered a few years ago as a result of valuable research work. If administered in the drinking water, the drug is absorbed into the bloodstream, where it has a destructive effect on the coccidia in the intestinal wall. It is rapidly absorbed and slowly eliminated from the blood, so need not be administered all the time.

It should be given as a 0.2 per cent. solution, which can be obtained by mixing the usual 16 per cent. solution of sodium sulphamezathine with water in the proportion of 1 pint of solution made up with water to a total of 10 gallons. This is given to chicks instead of ordinary drinking water for 48 hours. For the next three days they should receive unmedicated water, then a solution of the drug again for 24 hours, water again for three days, and a final treatment for 24 hours with the 0.2 per cent. solution of the drug. It is advisable not to



Above—A microphotograph of droppings from a coccidiosis-infected chick, showing numerous oocysts. The double outline of the shells is quite distinct. In this stage the parasites are not infectious. Below—The droppings 48 hours later, when the parasites had developed inside the shell into four spores each. When consumed by susceptible birds the spores are liberated in the bowels and, attacking the cells of the intestinal lining, start the infection.



begin treatment until symptoms appear, but to be prepared to do so immediately the disease begins, as indicated by the death of a chick or by blood-stained droppings, with the other symptoms described. If treatment is then begun immediately, losses will be cut short and treated chicks will thereafter be immune to the disease, but this valuable immunity may be lost if the drug is used as a preventive measure before the disease appears.

A similar drug known as sulphathiazole has also been used for coccidiosis with promising results.

So far results of treatment of the duodenal coccidiosis of older birds with sulphamezathine unfortunately have been less satisfactory than with the disease of chicks, but the use of this and similar drugs for these conditions is quite new, and better results may reasonably be expected with further experience and research.

Meanwhile attention should be directed to hygiene, the breeding of sound stock, preventive measures against worm infestation and other weakening conditions, and ensuring that birds are not overcrowded.

Other Precautions

Keeping more birds than has been shown by experience to be desirable in any given area, in the hope of bigger returns, is always false economy. It results only in a heavier concentration of droppings on the ground and a higher infection, not only with coccidia, but also with the eggs of worms and the germs of other diseases which are spread through the manure —for example, pullorum and tuberculosis. Four square feet should be allowed for each adult bird in intensive houses, and in addition either droppings boards or manure pits beneath wire-netting should be provided.

If droppings boards are used, they should be scraped clean as often as possible. Many experienced poultry farmers hold that scraping droppings boards clean every day is economic. The life cycle of the organism causing duodenal coccidiosis is exactly similar to that of the form which causes the disease in chicks, and the parasite, after being passed out in the droppings, requires 48 hours in which to develop before it can cause infection again.

Land used to rear poultry from the brooder stage to the time when they go into the laying houses should be used only for rearing, and no other poultry should be put on it at any other time. As with ground used for brooder chicks, the grass should always be kept short. These measures keep down worm infestation as well as coccidiosis. The resistance of birds should be kept up by an adequate supply of green food at all times.

If an owner experiences losses in chicks which he suspects to be caused by coccidiosis, the following steps should be taken:—

Six to a dozen dead chicks should be sent at once to the Animal Research Station, Wallaceville, with a letter giving full particulars of the outbreak. This letter is very important, but is often neglected by poultry owners, who seem to regard laboratory diagnosis as a guessing competition.

If symptoms are observed which are reasonably suggestive of coccidiosis, such as blood-stained droppings and deaths of chicks of about three weeks old onward, treatment by sulphamezathine should be instituted at once, without waiting for a reply from the laboratory.

Brooder-house floors should be kept clean, and droppings and litter should be removed every day.

Dead chicks should be removed and burnt, and all that are sick or weakly should be destroyed and the carcasses burnt.

The owner should communicate with the Poultry Instructor for the district for advice and information about a source of supply of sulphamezathine.

Disinfection of Brooder Houses

The best disinfectant for brooder houses after an outbreak of coccidiosis is a 10 per cent. solution of ordinary household ammonia in water. This should be sprayed and swabbed over floors and fittings and the houses left closed for three hours. They should then be opened and well ventilated. Chicks should not be put in again until floors have dried and for several hours after all smell of ammonia has disappeared.

SHOW DATES

THE following are dates and venues of A. and P. shows in October, November, December, and January.

October 16—Ellesmere A. and P. at Leeston.

October 20 and 21—Hawke's Bay A. and P. at Hastings.

October 22 and 23—Timaru A. and P. at Timaru.

October 22 and 23—Marlborough A. and P. at Blenheim.

October 23—Northern A. and P. at Rangiora.

October 28, 29, and 30—Waikato A. and P. at Hamilton.

October 29 and 30—Poverty Bay A. and P. at Gisborne.

October 29 and 30—Wairarapa and East Coast P. and A. at Carterton.

November 4—Ashburton A. and P. at Ashburton.

November 5—Amberley A. and P. at Amberley.

November 5 and 6—Manawatu and West Coast A. and P. at Palmerston North.

November 12 and 13—Wanganui A. and P. at Wanganui.

November 16 and 17—Thames Valley A. P. and H. at Te Aroha.

November 17—North Otago A. and P. at Oamaru.

November 19 and 20—Nelson A. and P. at Nelson.

November 19 and 20—Egmont A. and P. at Hawera.

November 20—Courtenay A. and P. at Kirwee.

November 20—Waimate A. and P. at Waimate.

November 20—Bay of Islands P. and I. at Waimate North.

November 20—Waihi A. and P. at Waihi.

November 20—Taieri Agricultural Society at Outram.

November 27—Kaikohe A. P. and H. at Kaikohe.

November 26 and 27—Stratford A. and P. at Stratford.

November 27—Banks Peninsula A. and P. at Little River.

November 30 and December 1—Otago A. and P. at Dunedin.

December 3—South Otago A. and P. at Balclutha.

December 4—Winton A. and P. at Winton.

December 4—Hauraki A. and P. at Paeroa.

December 4—Tokomairiro A. and P. at Milton.

December 4—Whangaroa A. and P. at Kaeo.

December 7 and 8—Gore A. and P. at Gore.

December 11—Wyndham A. and P. at Wyndham.

December 14, 15, and 16—Southland A. and P. at Invercargill (Royal Show).

December 18—Otago Peninsula A. and P. at Portobello.

January 8—Blueskin A. and P. at Waitati.

January 26—Marton District A. and P. at Marton.

January 28 and 29—Horowhenua A. and P. at Levin.

January 28 and 29—Taumarunui and District A. and P. at Taumarunui.

January 29—Tauranga A. and P. at Tauranga.

January 29—Helensville A. and P. at Helensville.

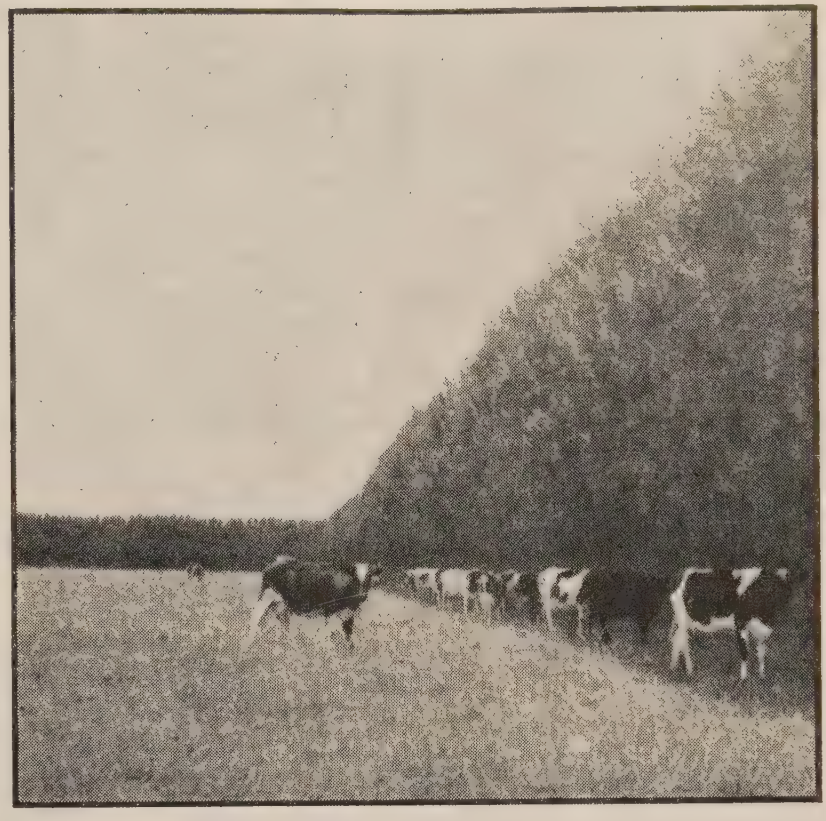
COMMERCIAL CELERY CULTURE.

Points in the successful production of good-quality celery are discussed in Bulletin No. 301, "Commercial Celery Culture," which is available free from any office of the Department of Agriculture.

PUSSY WILLOW AS FARM SHELTER ON HAURAKI PLAINS

By G. L. BANFIELD, *Instructor in Agriculture, Thames.*

THE pussy willow is regarded as a menace in many parts of New Zealand because of its ability to spread in semi-swamp conditions, but a farmer of Turua, in Hauraki Plains County, has demonstrated that this species can provide good farm shelter on the meadow soils of the Hauraki Plains where most other shelter species fail. Mr. W. McKee, who came to New Zealand from Northern Ireland, was familiar with the use of pussy willow there. It was used extensively for farm shelter and was also regarded as being of some importance as a means of stopping flying weed seeds. The deciduous nature of pussy willow led to the belief that the species would be very suitable on the Hauraki Plains because it would produce very little shading in winter.



Shelter from the hot sun is appreciated by the dairy herd.

ON Mr. McKee's property today there is a pussy willow shelter belt along almost every boundary or subdivision fence, giving the farm a most attractive appearance. The value of the hedges as shelter from the hot summer sun can be judged from the way in which the dairy herd makes use of them (see illustration on this page). Even during winter, when the leaves have fallen, the close growth provides adequate shelter from cold winds, a feature which is apparent if one stands in a gateway in the shelter belt on a boisterous day.

When grown along drain banks pussy willows prevent the sides of the drains from slipping, and there is no excessive weed growth in the drains.

It is significant that during the summer, when the transpiration rate of the willows would be very high, it has been the experience that all drainage from the cowshed and piggeries is completely absorbed by the willows on the drain banks. Mr. McKee maintains that the absorption of moisture by the willows during the summer leaves the ground in good physical condition for drainage during the winter, but this is likely to be a contentious point.

It has not been found necessary to trim the willows on this farm and the uniform growth can be seen in the illustration on this page. The oldest belts on the farm are 16 or 17 years old and have apparently reached maximum height—about 25ft. Mr. McKee says they do not grow as high in Northern Ireland, probably because there the soil is less fertile and the climate more rigorous.

Unlike most other species of shelter tree on the Hauraki Plains, pussy willows have the important advantage that they do not blow over, no doubt because their roots grow almost straight down. Certainly they do not interfere with drains, and according to Mr. McKee they are excellent for firewood.

The dairy herd on this farm is one of the healthiest on the Hauraki Plains, and it is contended that the good condition of stock can be attributed partly to the excellent shelter provided and partly to some beneficial effect derived by the animals through chewing the bark and foliage of the willows.

Establishment

It has been found that the willow is most satisfactorily established from cuttings about 2ft. long and 2in. thick. No cultivation is required. A spade is driven into the soil and the cutting placed in the opening with the greater part below ground level. Where country is liable to dry out in summer planting should be done in May or June so that an adequate root system can develop before the hot weather. However, in areas less liable to dry out planting in July is quite satisfactory. Mr. McKee recommends that cuttings should be planted 18in. to 2ft. apart, and 2 to 3ft. from the drain banks. Good shelter 10ft. high is obtained in 2 or 3 years.

Protection from Stock

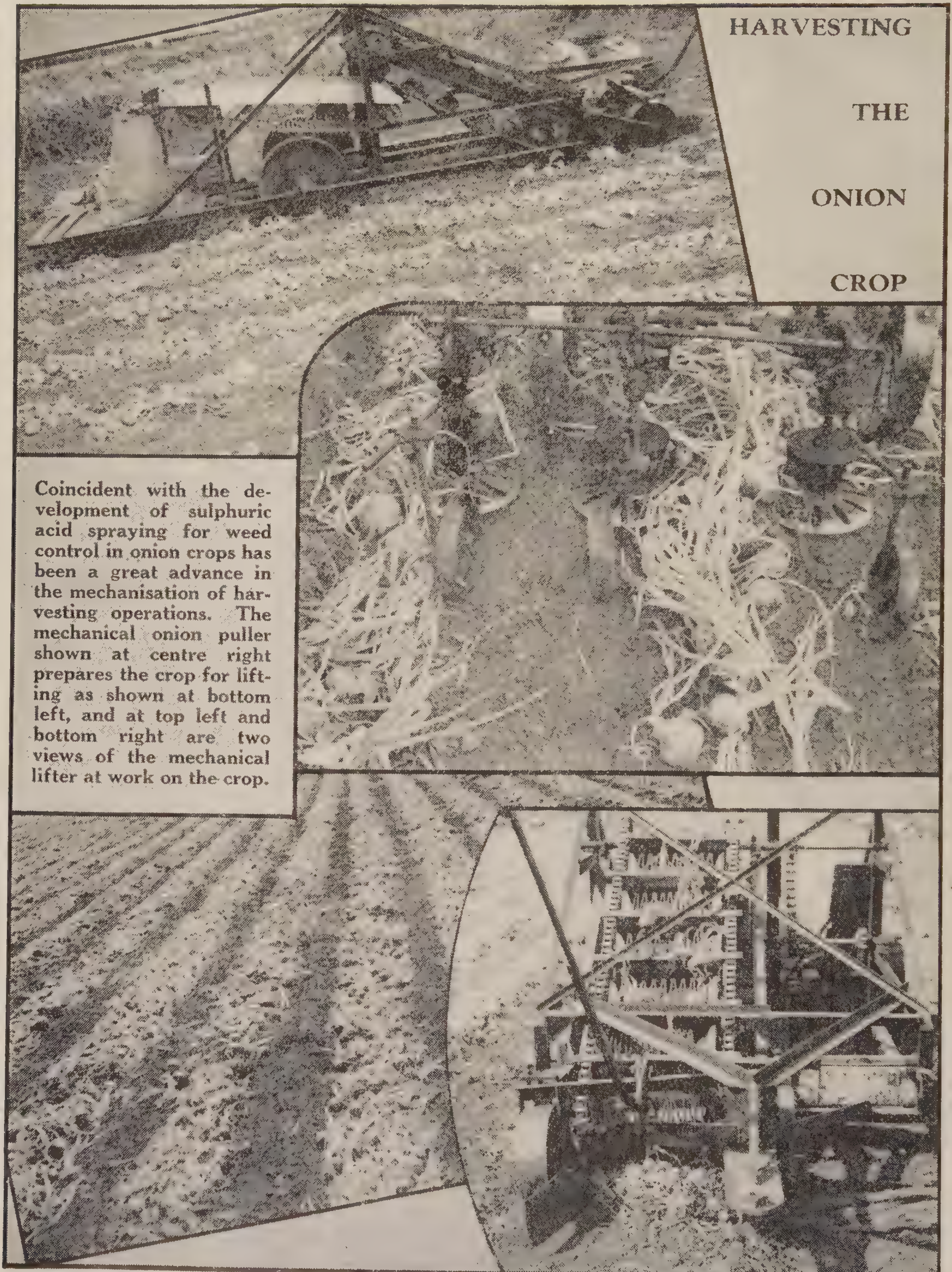
Stock are extremely fond of the foliage of pussy willow and will also tear the bark from the lower limbs, so that some protection is necessary. Mr. McKee relies on a single-wire electric fence, of which he has five miles on his farm. He has only one generator, but he maintains that it is adequate providing the fences are kept in order and properly insulated.

The fence is placed 3 to 4ft. from the willows until they are properly established, but later it can be as close as 2ft. That indicates how little ground is wasted.

The willows may be got rid of whenever necessary by chopping them down and allowing stock to graze them.

It would appear, in view of the adverse effect of excessive shading by gums and cypresses on the meadow soils of the Hauraki Plains, that pussy willow may supply an answer to the shelter problem on this class of country.

HARVESTING THE ONION CROP



Coincident with the development of sulphuric acid spraying for weed control in onion crops has been a great advance in the mechanisation of harvesting operations. The mechanical onion puller shown at centre right prepares the crop for lifting as shown at bottom left, and at top left and bottom right are two views of the mechanical lifter at work on the crop.

SULPHURIC ACID CONTROLS WEEDS IN ONIONS

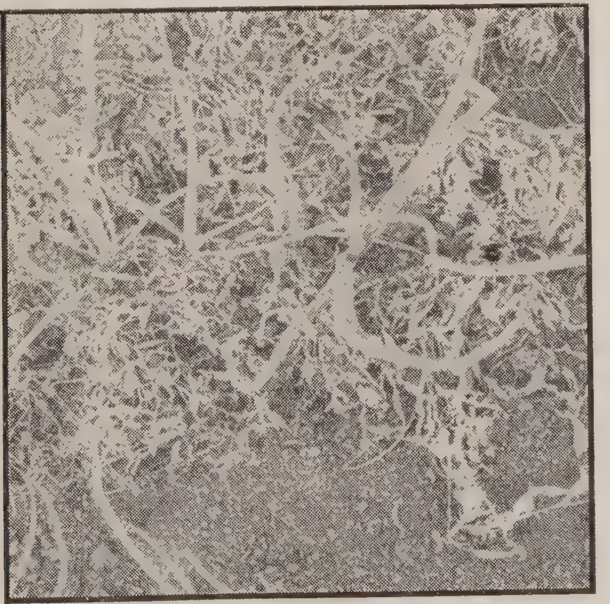
Spraying Methods and Equipment Devised by Manawatu Growers

By C. J. HAMBLYN,
Fields Superintendent, Palmerston North.

SULPHURIC acid spraying of onion crops for weed control, introduced to onion growers in the Opiki district of the lower Manawatu by officers of the Department of Agriculture some three years ago, has been taken up by growers with very satisfactory results. Last season some 350 out of the total area of 450 acres of onions grown in the district were treated with sulphuric acid solution for the control of weeds, this rapid development of the practice being made with makeshift spraying apparatus because of the lack of equipment in this country properly adapted to handling the acid solution.

The growing crop after the death of weeds after the last spraying.

SULPHURIC acid is probably one of the first selective weedkillers used in agriculture, solutions of this acid having been used on the Continent and in Great Britain for the past thirty years or more for the control of wild turnip or charlock in cereal crops such as wheat, oats, and barley. In France, for instance, in 1931 some 27,000 tons of concentrated acid was used almost wholly on cereal crops for the control of weeds such as charlock. About 500,000 acres were treated in 1933. In 1934, 20,000 acres were treated in England and by 1946 practically all commercial onion crops were treated with sulphuric acid sprays for the control of weeds, the initial trials on this crop having been started only in 1941. The use of this acid on the main onion crop was an outstanding wartime development in England, where shortage of labour forced on growers a very rapid development in the use of such weedkillers as a 10 per cent. solution of sulphuric acid for the control of weeds in onion crops and power kerosene for the control of similar weeds in carrot crops.



The kill of weeds after late spraying.

The almost universal adoption of sulphuric acid as a means of controlling weeds in the onion crop in Great Britain has led to the provision there of special equipment such as containers, pumps, and nozzles which is resistant to the weak acid solution used.

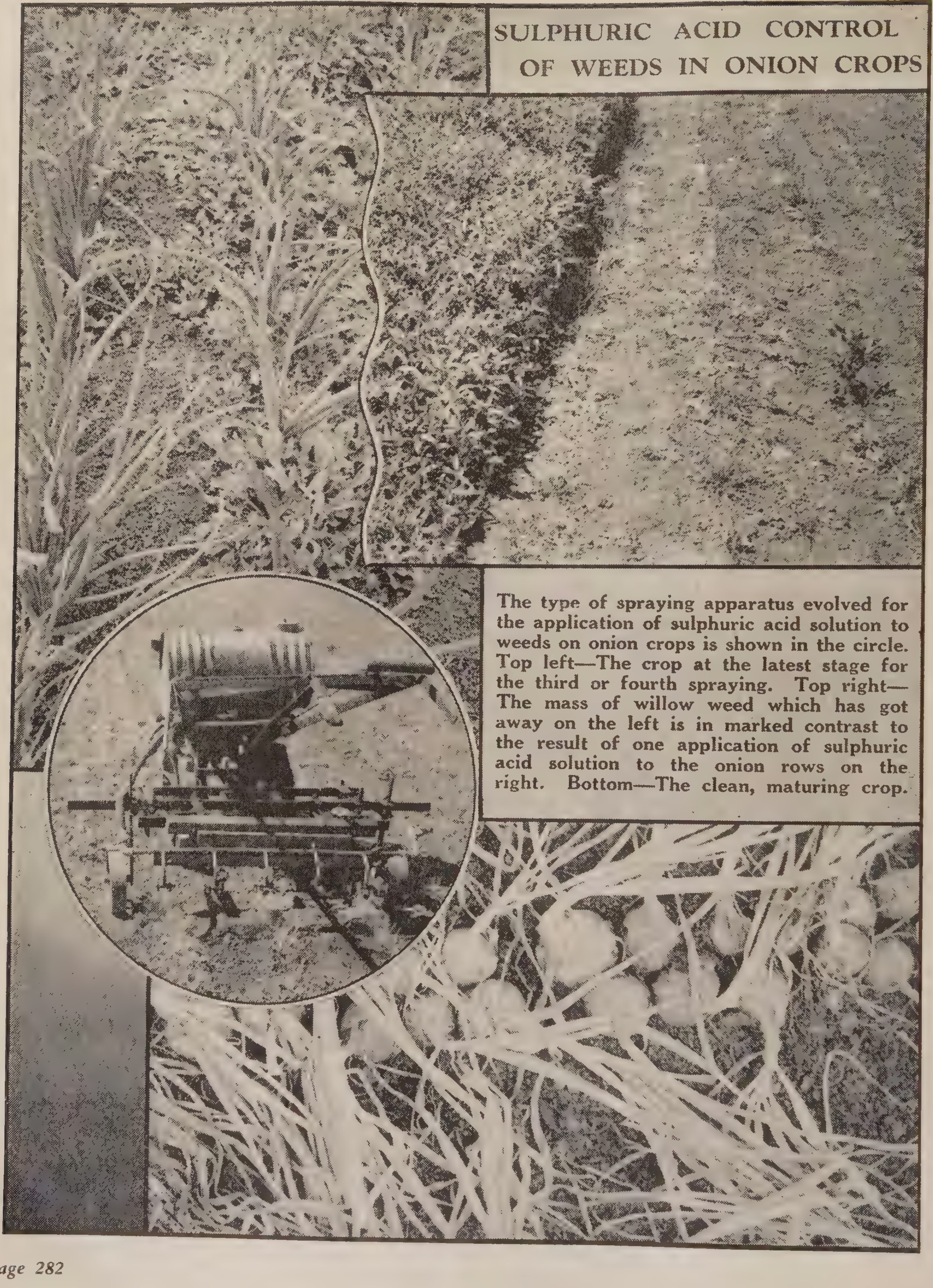
A good deal of credit for the rapid development of the use of the acid in the Opiki district is due to the enterprise and initiative of Mr. A. Gillespie, whose methods and results should be of interest and assistance to growers in other districts.

Mr. Gillespie grows from 50 to 60 acres of onions, some 40 acres of potatoes, and a few acres of carrots. In the past he has found it difficult to keep ahead of the work of keeping his onion crop free from weeds, particularly in the early stages, when the ground is often too wet for good weeding. Willow weed (*Polygonum persicaria*), which is very prevalent and a particularly rapid grower on this country, is the worst weed at this stage, and despite the employment of from 25 to 30 extra hands for weeding, part of the crop has often been lost through a smother of weeds. With the use of sulphuric acid weeds have been successfully controlled on the whole 60 acres and Mr. Gillespie is confident that with this method and with better equipment the keeping of this acreage of onion crop free from weeds and in a healthy, thriving condition will become a minor problem of production.

Spraying Apparatus

The season before last Mr. Gillespie and other growers used ordinary knapsack sprayers and found that if the container was washed out carefully with a solution of ordinary washing soda immediately after use the sprayers would last a season or more. One man with such a sprayer could cover 1½ to 2 acres a day. The results of the spraying were very satisfactory. Between seasons the devising of apparatus to do the work more rapidly and with less labour was given attention, and the apparatus which was used very successfully last season by Mr. Gillespie and quickly adopted by other growers was evolved. A small copper cylinder to hold the solution was mounted on a small garden tractor, and a small piece of ¾in. rubber hose led from the cylinder to a small bronze pump with a stainless-steel spindle, the pump being mounted on the tractor frame. From it another ¾in. piece

SULPHURIC ACID CONTROL OF WEEDS IN ONION CROPS



The type of spraying apparatus evolved for the application of sulphuric acid solution to weeds on onion crops is shown in the circle. Top left—The crop at the latest stage for the third or fourth spraying. Top right—The mass of willow weed which has got away on the left is in marked contrast to the result of one application of sulphuric acid solution to the onion rows on the right. Bottom—The clean, maturing crop.

of rubber hose carried the liquid under pressure to the spray boom, which was also of copper, and to it were fitted six ordinary knapsack sprayer nozzles spaced to spray over and between the rows. The pump was so mounted that it could be driven by a V belt from the end of the main shaft of the tractor engine.

With this apparatus some 5 to 6 acres could be sprayed per day, the day in this case being generally of not more than five to six hours because of the advisability to spray only when the plants were dry and the atmosphere as dry as possible also. The metal parts of this apparatus, being mainly of copper or bronze, which are much more resistant to the weak acid solution than is iron or steel, gave good service. The copper container was kept in good condition by careful washing out with a solution of washing soda, and this solution was also put through the pump and spraying nozzles after the day's work to help to prevent corrosion by the acid. The steel spindle was found to be an essential in the pump, and, with this fitted, the pump gave little trouble. The nozzles tended to wear away at the outlet holes, which were refilled with metal and rebored to the desired size when required.

Controlling the Weeds

The onion crop was sown last season between August 20 and September 27, the favourable season allowing for earlier completion of this work than is sometimes possible. It was intended to begin spraying by using a 7½ per cent. solution of standard sulphuric acid as a pre-emergence spray, that is, a few days before the onion seedlings appear through the ground, but it was found that weather conditions prevented this with the crops sown first, and later the apparatus was fully employed in crops already up. Pre-emergence spraying after the onions have sprouted in the ground and before they actually emerge is standard practice in the use of sulphuric acid sprays in England and gives the crop an excellent start free of weeds.

The first spraying in this case was done soon after the second leaf of the growing onion plant straightened up. When this leaf is still bent the spray lodges on the bend and cuts this leaf off, damaging the plant. Spraying was found to be most effective when the weather was fine and the atmosphere dry. It was a waste of time to spray when the plants were wet with dew or rain or if the day was very dull.

The last spraying was done when the onions were 8 to 10in. high and the spread of leaves across the rows just allowed the narrow-wheeled tractor to go down the rows. The first sprayings destroyed all the early weeds such as willow weed (*Polygonum persicaria*), docks (*Rumex* spp.), cress (*Coronopus didymus*), and the two varieties of chick weed (*Cerastium vulgatum* and *Stellaria media*), as well as suppressing sheep's sorrel (*Rumex acetosella*). The chick weeds were found to be the most resistant. The later spraying dealt with nightshade (*Solanum nigrum*), fat-hen (*Chenopodium album*), and sow thistles (*Sonchus* spp.), as well as white clover (*Trifolium repens*) seedlings which sometimes become serious in wet seasons.

The spray was not effective on the grass weeds, the most troublesome of which in this locality are *Poa annua, Poa trivialis,* and in some places tall fescue (*Festuca arundinacea*). These were dealt with by hand weeding, the cost of which was, however, very much reduced.

Because of the limited capacity of the apparatus, the weeds in several areas of the crop got well away at times, but even where such weeds as willow weed or fat-hen covered the onions entirely spraying was very effective and allowed the onions to come away again.

Solution and Rate of Application

Standard sulphuric acid of 1.83 specific gravity readily obtainable from fertiliser works and packed in easily-handled earthenware containers is used. The 10 per cent. solution used for spraying is made by adding 1 gallon of acid to 9 gallons of water and stirring. **The water should never be added to the acid.** Mr. Gillespie's practice is to fill the copper cylinder with the required proportion of water and then add the acid. The average rate of application found to be generally effective as long as the weeds were young was about 65 gallons per acre, so that some 6½ gallons of acid was required for each acre.

Where weeds were out of hand or persistent weeds were left after a previous spraying the rate of application was increased either by speeding up the pump or by reducing the speed of travel down the rows; conversely, where the onions were very young and the weeds also very small the rate of travel was increased to give a lighter application of spray.

No difficulty has been experienced in handling the acid and carrying out the work and there should be no danger to workers providing a few simple precautions are taken. First there should always be several barrels or tins filled with a solution of washing soda at the mixing place, so that any acid spilt on clothing or on the hands or body can be rendered harmless by the immediate application of some of this solution. The soda solution should also be used freely for washing out the apparatus after each day's use.

Sulphuric acid is used freely in Great Britain and other countries for the control of charlock in cereals, for burning off blighted potato tops or green tops of early potatoes before digging, and on the onion crop, and if the precautions mentioned are taken, there is no great danger.

Reduction in Costs

The use of sulphuric acid spraying, beside effecting a considerable reduction in the cost of weeding onions, should ensure full control of all weeds of the crop except grasses if the capacity of the apparatus is adequate for the job.

The acid required for the work costs about 27s. per acre and with three or four applications for each acre it is estimated that acid spraying costs between £7 and £10 per acre. Where grass weeds occur, as they do at Opiki, some hand weeding is necessary to deal with them and odd persistent weeds. Last season Mr. Gillespie's weeding of this type was done by six hands including three to four casuals. Before using acid spraying he employed between 25 and 30 casual hands and the cost of hand weeding was between £30 and £40 per acre. In addition he was never sure of being able to keep the weeds controlled.

As a direct result of the development of mechanical equipment for weed control on this crop has come the introduction of mechanical harvesting, including the use of such equipment as mechanical onion pullers which handle two or four rows at a time, leaving the onions in double rows to dry out, and mechanical pick-up machines, some of which also top and tail the crop ready for bagging. Most growers prefer to store their onions after picking up without topping; topping and grading are then done during autumn and winter and give employment to the permanent hands. The aim with the use of such equipment and a small variety in types of crop grown is to maintain a permanent staff with a minimum requirement of casual labour for weed control and harvesting.

The writer's thanks are due to Mr. Gillespie for providing the details of his operations incorporated in this article.

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Verticillium Wilt of Apricots

By L. R. RENOUF, *Orchard Instructor, Alexandra.*

VERTICILLIUM wilt, a fungus disease common on tomatoes and potatoes, has been causing damage to apricot trees in the Alexandra district during the past few years. The disease was recorded by the Plant Diseases Division of the Department of Scientific and Industrial Research in 1945. This was the first occasion it had been isolated from stone fruit trees in New Zealand, but it had previously been recorded on plum and apricot trees in Europe and America.

VERTICILLIUM wilt is caused by the fungus *Verticillium dahliae* Kleb. Infection occurs through the roots of the trees; the fungus grows up through the branches and, once established, causes extensive damage.

Symptoms of Disease

The first indication of the presence of the disease in apricots is the yellowing of foliage on the lower parts of yearling wood, from 9in. to 18in. usually being affected. This foliage drops and bare parts are then conspicuous. The most upright-growing young wood is the first affected.

At this stage of affection the tops of new growths still appear healthy and growth is carried on, but if the wood is cut, it shows discoloration, which varies from light browning at the tops and increases in darkness downward into older wood. Very dark discoloration shows in wood four years old and older.

Usually only part of the tree is affected, but sometimes the whole tree will show the trouble at one time.

If the disease intensifies, wilting of the top foliage occurs, followed by wilting and dying of branches. As a result whole leaders or even whole trees may die, but often branches die part way down and the growth below appears healthy, though discoloration will show in the wood.

Branches may also be affected and not die. When this occurs it will be found that the season after the first appearance of infection growth will be weak, bare parts will be in evidence, and affected parts will appear sickly.

Infected trees may then grow in a normal manner, but leaders are bare for several feet, thus considerably reducing the carrying capacity of the trees. Discoloration of the wood will still be noticeable, indicating that the disease is present and likely to show up in more damaging form.

The extent of damage caused by this disease can be seen in several orchards in the Alexandra district. In one orchard 96 trees in a block of 300 five-year-old trees were showing infection in the autumn of 1947 and several others had previously been taken out. In 1945, 72 trees in this block were showing the trouble. In another block of 275 six-year-old trees 58 were showing infection in the autumn of 1947 and more than 100 trees have been replaced over the past few years. The infection has increased each year in these orchards and the final extent of the damage cannot be estimated.

Most of the infected trees are from three to ten years old, but the disease has been found on trees up to 20 years old.

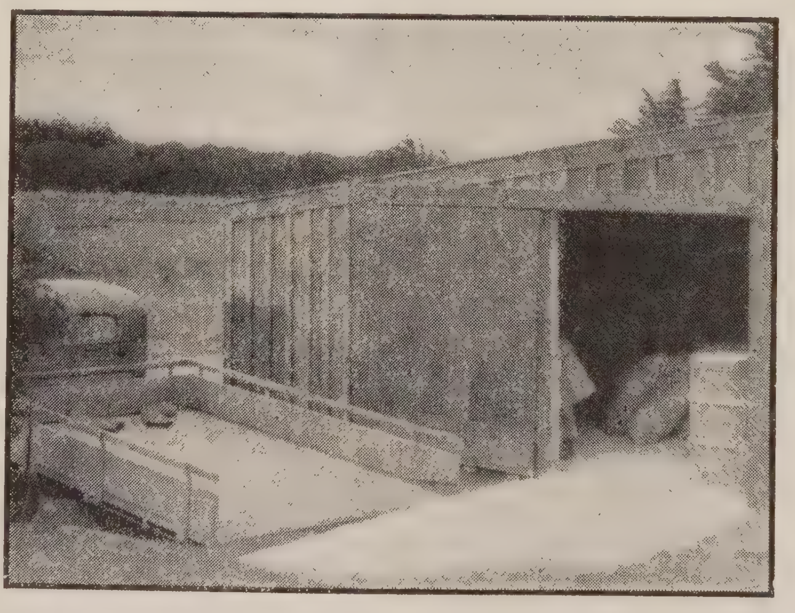
Cause of Infection and Control

Verticillium wilt fungus is carried over in the soil, and in each instance where infection has been found tomatoes have been grown in the ground either before apricots were planted or between the trees after planting. It is by this means that the fungus has been introduced.

Once the disease is established in an orchard there are no means of eradicating it. Sterilisation of the soil, the only efficient way of eliminating the trouble, is not practicable under orchard conditions. Where infected trees have to be removed the ground should be either left fallow or replanted with trees other than apricots.

As the obvious source of infection is from tomatoes, apricots should not be planted in ground previously used for growing tomatoes and tomatoes should not be planted among apricot trees.

Concrete on the Farm



The use of concrete on dairy farms is increasing rapidly. Wide grass lanes to cowsheds which in winter become quagmires are in a number of cases being replaced by narrower lanes of concrete, and concrete aprons round gateways and water troughs are among the many other uses for concrete on the farm which are more in evidence daily.

The concrete loading ramp illustrated could be laid down by any amateur and shows how the use of concrete has contributed to the convenience of the layout of the fertiliser shed on a small farm at Kapuni, Taranaki. A good fall on the apron and the sliding door ensure that fertilisers are kept dry until required.

—E. M. BATES, Instructor in Agriculture, Hawera.

PHYLLOXERA-RESISTANT VINES

The properties, characteristics, and appearance of more than a score of grape vines which have been tested at the Government Horticulture Station, Te Kauwhata, are analysed in Bulletin No. 276, "Phylloxera-resistant Vines." The life history of the pest phylloxera and the various forms in which it can exist are also fully explained. This bulletin, containing information of great importance to every commercial grower of vines in New Zealand, can be obtained free from any office of the Department of Agriculture.

CONTROL OF DISEASES OF PIGS

CONSIDERABLE loss is caused to the pig industry each year by the deaths of pigs or the rejection or condemnation of carcasses as the result of disease. Greater attention to management, housing, and feeding can do much to reduce this loss, which not only affects producers in New Zealand, but lessens the amount of food available to Britain. The importance of management and feeding in relation to disease prevention is stressed in this article by D. M. Corbett, Veterinarian, Department of Agriculture, Whangarei, who discusses the recognition and treatment of the more common diseases of pigs.

A run-off on good pasture is beneficial to both sow and litter.

DILAPIDATED, unhygienic piggeries, feeding troughs broken and filthy, and surroundings deep in mud contribute largely toward lowering the resistance of the pig to bacterial infection and can be the cause of outbreaks of disease. Under such conditions pigs are likely to develop digestive troubles, pleurisy, arthritis, or other diseases which often result in high mortality, rejection or condemnation on slaughter, or in pigs which survive an unthriftiness which makes their rearing unprofitable.

Housing

Expenditure involved in erecting suitable housing is amply repaid by the healthier stock produced, a decrease in labour costs and time involved in feeding, and a general improvement in management.

Piggeries do not have to be elaborate, but should be airy and large enough to prevent overcrowding, yet free from draughts. They should allow ample light and be provided with adequate drainage. The site of a piggery should be chosen so that enough well-drained land is available for alternate run-offs or, if necessary, paddocks for cultivation of supplementary fodder.

As newly-purchased stock are frequently the cause of outbreaks of disease, provision should be made for their isolation. These pigs may already be diseased when bought, or may suffer a digestive upset and therefore a lowering of resistance because of the change of diet; bacteria present then increase in virulence and become capable of causing disease. The whole herd may suffer as a result, because, even if the death-rate is not high, affected pigs become unthrifty and may take many months to reach marketable quality.

Feeding

To keep the pig in thriving condition and to ensure that it has a considerable degree of resistance to disease the diet must be properly balanced and contain all the essentials for health. In addition, feed must be given at regular intervals and in the required quantities.

During winter young pigs may suffer from dietetic deficiencies. This is especially noticeable where there is a lack of greenfeed and little sunshine. Though skim-milk provides an adequate supply of lime, the body cannot utilise it in the absence of vitamin D, which is removed in the butterfat. Where pigs are exposed to sunlight this is remedied to some extent, but the addition of cod-liver oil to the diet will give good results. Where growing pigs are fed on skim-milk alone a run-out on pasture is essential. The green food provides starchy food, vitamins, and minerals without which the young, growing pig loses its resistance to disease and may become stunted, unthrifty, and uneconomical to rear.

Care of the Sow

The feeding of the breeding sow is most important if strong, healthy litters are to be produced. Too often sows are turned out to forage for themselves immediately their litters are weaned and are expected to exist as best they can until next farrowing.

This is surely a short-sighted policy, as the care of the sow during pregnancy and attention to her diet will help to ensure a vigorous litter which with normal attention should survive with minimum loss.

A great strain is put on the resources of the sow both during pregnancy and lactation, and if there is any likelihood of her diet being deficient in lime or phosphate, a mineral supplement should be given. This dificiency is likely to occur where little milk is available and pasture is poor, and piglets born under these circumstances are likely to be stunted and unthrifty. A little of the following mixture added to the feed should provide for any likely deficiency:—

	Parts (by weight)
Steamed bone flour	20
Ground limestone	10
Common salt	5
Oxide of iron	2

A fortnight before farrowing the sow should be put in her farrowing pen to accustom her to her surroundings. Care should be taken that any dietetic change at this period or after farrowing does not cause a digestive disturbance and diminution of the milk flow. To eliminate any tendency to constipation a small amount of molasses may be added to the feed.

Salmonella Suipestifer

Infection with the suipestifer organism is the cause of a high percentage of losses of pigs in New Zealand. These bacteria have been found by American research workers to be present in the intestines of about 6 per cent. of healthy pigs, and though the disease is most frequent where conditions are insanitary, an outbreak can occur even in model piggeries where dietetic errors and other factors tend to lower the resistance of the body.

Causes

Cold, draughty housing, open, muddy runs with little shelter, dirty pens, and contaminated feeding troughs are conditions which lower vitality. Suckers and weaners are the most commonly affected, though an acute form of the disease often results in high mortality in baconers.

Lack of nourishment in the sow or sudden changes in her diet are quickly reflected in the suckers, and if bacteria are present, ideal conditions are created for their increase. Furthermore, young pigs often suffer a setback at weaning time either through consuming unsuitable feed in the mother's trough or being too rapidly changed to a new diet.

Once it is established infection may spread throughout the herd. The acute type in baconers can often be

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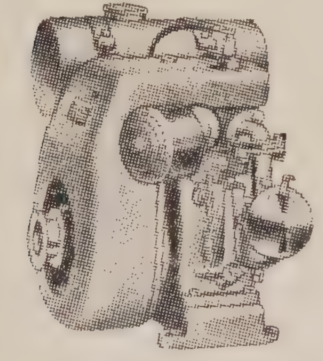

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Well-sheltered runs eliminate chills, which lower the vitality of young pigs.

traced to overfeeding or a sudden change in the diet, and can occur during a final effort to increase the weight in the last few weeks. Pigs run on pasture are accustomed to grass feed and plenty of exercise, and when suddenly confined to a pen and given an excessive amount of milk (often with the addition of meat meal, grains, and potatoes) constipation and enteritis (inflammation of the bowel) are likely to result.

Infected bought stock which cannot be isolated through lack of facilities have often been the cause of an outbreak.

Symptoms

The symptoms of the disease, which may be classed as acute, sub-acute, and chronic, vary. The acute type usually affects porkers or baconers, the only noticeable symptoms being constipation, loss of appetite, and dullness; death occurs within 24 to 48 hours. The carcass shows purple discoloration of the skin at the base of the ears, the abdomen ("blue belly"), and inside the thighs. When opened all organs are found to be congested and dark, there may be dark patches on the stomach lining, and the intestines have a yellow catarrhal coating.

The more common sub-acute and chronic types may affect either or both the respiratory and digestive systems. When the chest is affected the onset may be gradual, breathing becomes hurried, a cough develops, a discharge appears from the nostrils, and condition is rapidly lost. Death may occur at any time in the course of the disease, or the pig may survive and become a chronic case, stunted, unthrifty, and a carrier of disease.

When the digestive system is affected death may be rapid, especially in suckers. Diarrhoea, inappetence, and wasting, with a high death-rate, are usual. As with the respiratory type, the survivors are unthrifty and odd deaths occur periodically.

Post-mortem examination reveals dark-red areas on the skin of the ears, belly, and inside the thighs. The lungs are found to be pneumonic, semi-solid, and adhering to the chest wall, and when cut a sticky yellow pus exudes. The covering of the heart may be distended with fluid, or the heart and lungs may be stuck together in one mass. When the stomach is opened dark, inflamed patches are found, and the intestines are thickened and pitted with numerous small ulcers.

Prevention

Preventive measures should aim at eliminating errors in management and feeding which bring about lowering of resistance. The provision of well-drained housing free from draughts, yet large enough to prevent overcrowding, runs on good pasture, cleanliness, especially in feeding, and adequate diet are the essentials of good pig-keeping. Care of the sow during pregnancy will ensure a virile litter, and checks in growth at weaning may be prevented by creep feeding and avoiding sudden changes in diet. Vitamin A, which is present in butterfat and green food, is an important factor in maintaining resistance to infection, and where only skim-milk is fed and pasture is poor or runs impracticable the addition of a little cod-liver oil and meat meal will provide the necessary vitamin.

Treatment

Treatment consists of isolating affected pigs, which should be provided with warm, comfortable quarters and given whole-milk, molasses, and lime water for some days. Sulphate of iron given in small doses to suckers at the rate of ½oz. to a pint of water is often effective in controlling scours.

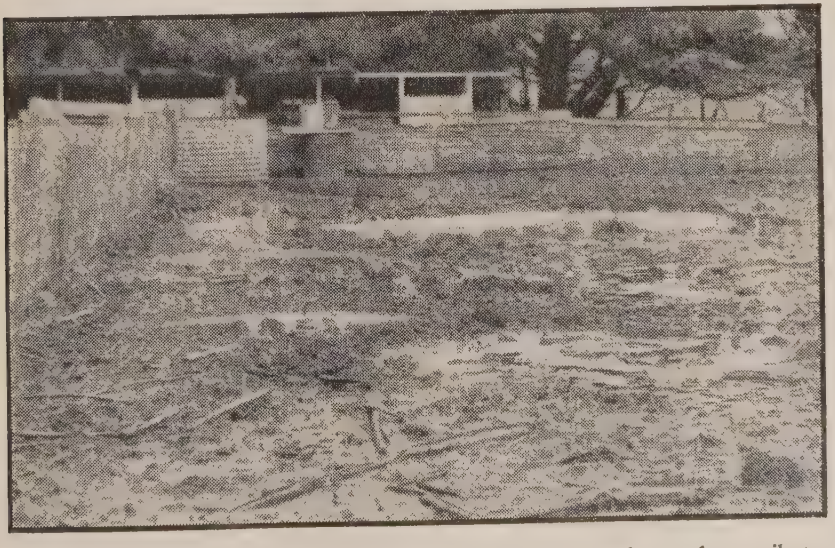
Baconers affected with the acute form of the disease are best given a laxative of 1 to 2oz. of Epsom-salt in the milk, and the feed should be cut to half. This, along with a run at good pasture, often checks the course of the disease.

Sulpha drugs have given favourable results in some cases, but a veterinarian should be consulted regarding their supply and use.

It is hoped that as a result of research work being carried out a vaccine will one day be available, but until then any likely carriers of the disease should be slaughtered, the piggeries disinfected, and where disease recurs it may be necessary to spell the runs for a period, fill in all wallows, and apply a heavy dressing of burnt lime, or plough up and regrass.

Pasteurellosis

Pleurisy and pneumonia are often the results of infection with the pasteurella organism, which, like salmonella, becomes active when the defences of the body are weakened through unbalanced or inadequate diet and insanitary conditions in and around the piggeries. Symptoms are dullness, feverishness, and rapid breathing; early deaths often occur in affected pigs. Newly-purchased stock are especially liable to suffer, because



Dilapidated, unhygienic piggeries and surroundings deep in mud contribute largely toward the lowering of the pig's resistance to disease.

of unfavourable transport conditions and change in diet. Overfeeding is a common fault with newly-purchased stock, which may have been on short rations before sale. It is advisable to keep such pigs separate from the rest of the herd for ten days and not to overfeed, but rather to increase the ration gradually, allowing them time for adjustment to the new conditions.

Treatment with sulphonamide drugs has proved valuable, but removal of the causal factors is the obvious solution.

Tuberculosis

As clinical signs of tuberculosis are rarely apparent in affected young pigs, the existence of the disease is often first realised on perusal of the killing sheets. The most common source of infection is milk from tuberculous cows and where condemnations of pigs occur the dairy herd must be carefully examined and any suspicious cases reported to the local Inspector of Stock. Clinical symptoms which may be recognised in old boars and sows are swelling of the throat glands, chronic cough with unthriftiness, and in sows enlarged mammary glands which may become ulcerated. Infected animals are likely to spread infection and should be slaughtered and buried deeply or burnt. Pens and runs are also contaminated by infected pigs, cows, and poultry, and the tubercle bacillus, though rapidly destroyed by direct sunlight, may survive in mud and manure for a considerable time. The pens should therefore be thoroughly cleaned and disinfected and runs well limed or ploughed up and cropped.

The following are symptoms of tuberculosis to be looked for in cattle:—

1. Where the lungs are affected loss of condition with chronic cough.
2. Infection of the throat glands, which causes the head to be carried extended and a typical roaring sound in breathing.
3. Enlargement of the superficial lymphatic glands, chiefly those below the ear (parotid), in front of the shoulder (prescapular) and the fold of the flank (precrural), and high up at the back of the udder (supramammary).

Spirochaetal Ulcers

Injuries caused through nails, barbed wire, rubbish round the sties, and bites through overcrowding at the feeding trough may become contaminated by surrounding filth and develop into abscesses and necrotic sores. These sores or spirochaetal ulcers are caused by infection of wounds with spirochaetes, which are organisms in mud, dust, and manure. They invade the tissue round the wound, causing a dark, foul-smelling sore covered with a scab.

Many owners through lack of time or negligence send affected pigs to freezing works, where they are rejected or condemned. If treated early, the sores would heal quickly, and a considerable saving of badly-needed food could be made.

Treatment

Scrubbing of the necrotic sores with soap and water to remove the scab and subsequent dusting with tartar emetic powder usually effect an early cure; only one or two applications of the powder at weekly intervals are necesary. Where sores are in or near the mouth the use of tartar emetic powder is not advised, as poisoning may result. In such cases painting with stock iodine or dusting with sulphanilamide powder is effective.

It is important that the scab be removed before application of the powder; otherwise spirochaetes under the scab will not be destroyed.

Careless Castration

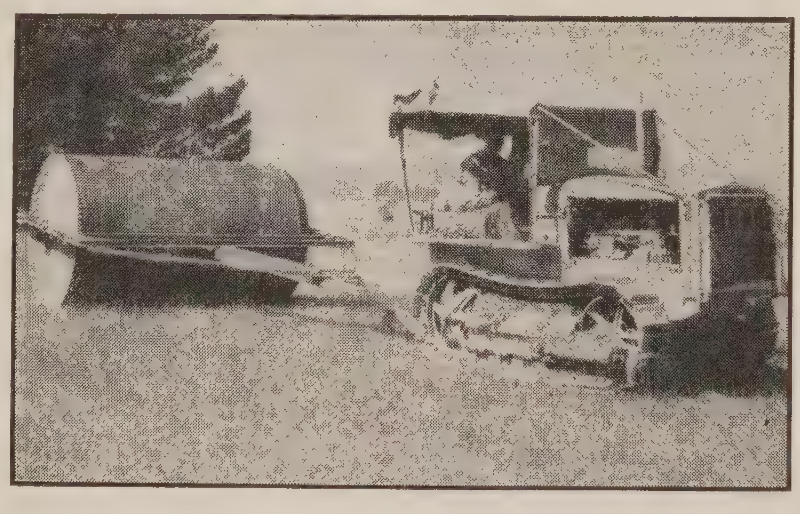
Too many pigs are still rejected or condemned at freezing works because of abscess formation or peritonitis as the result of careless castration. Castration is best performed when the pig is about a month old, as at that age there is less likelihood of infection and healing is rapid.

Aseptic precautions should be taken by cleansing the hands and site of operation with a weak disinfectant. An operator has been known to prepare himself carefully for castrating pigs by washing his hands and instruments in antiseptic and then to assist in catching the pigs. He forgets, however, to rewash his contaminated hands before proceeding with the operation, thus exposing the pigs to the risk of infection.

In carrying out castration a long, clean incision should be made. It is a mistake to use strong antiseptics on the wound, as they are likely to damage the tissues and retard healing. Newly-castrated pigs are best allowed to run on clean pasture, or if confined, the pens should be clean and dry.

The art of pig-keeping is to breed from good stock, give every attention to the breeding sow, provide comfortable, hygienic housing, and allow adequate feed with no sudden changes in the diet. Under such conditions the defensive mechanism of the body should provide adequate protection against disease.

A Home-made Heavy Roller



A VERY useful home-made heavy roller was designed and built by Messrs. F. and W. McRae on their property at Benmore, Southland, from an old steel boiler. Twenty inches of concrete was set into each end of the boiler, and axles were made by cutting old tram trolley axles in half and embedding the tram wheels in the concrete of the roller. Each of the protruding axle ends runs in a bearing housing from an old sawmill, and the housing was bolted to iron rails forming a frame to which a long drawbar was attached. (A short drawbar caused turning difficulties.)

The tendency of the concrete ends to shift slightly inside the steel casing results in a crumbling and breaking of the concrete next to the casing, and Mr. F. McRae advises that anchor strips of metal embedded in the concrete and welded to the boiler before the concrete is poured would overcome this fault.

Between the two 20in. ends of concrete the roller is hollow, and by means of a 2in. hole through the concrete at one end the roller can be filled with water to increase its weight from 5 tons empty to 11 tons filled.

The roller is unmanageable on even rolling country, but on flat paddocks it is particularly useful for consolidating seed-beds or for pressing stones beneath the surface of the paddock.

—*W. L. HARBORD, Fields Instructor, Invercargill.*

Adequate Cobalt Supplements Essential for Bush-sick Land

WITH the rise in prices which accompanied removal of the subsidy on fertilisers in September, 1947, the question has arisen whether it is now worth while to topdress with superphosphate as extensively as previously. On bush-sick farms where it is the practice to topdress with cobaltised superphosphate a reduction in the amount of fertiliser used would result in a decreased uptake of cobalt by stock, with consequent risk of serious losses and lowered production. This article by E. D. Andrews, Senior Biochemist, Animal Research Station, Wallaceville, stresses the essentiality of adequate cobalt supplements for the maintenance of stock health on cobalt-deficient country.

BUSH sickness is a wasting disease affecting sheep and cattle; horses and other non-ruminants appear to be immune. In ruminants sheep are more affected than cattle, and young animals more than mature animals. The disease is characterised by loss of appetite, culminating in severe cases in extreme emaciation and death. Hair and wool become harsh and the fleece tends to be of poor quality.

On severely-bush-sick country both sheep and cattle are affected. On less-acutely-afflicted areas sheep become sick, but cattle remain healthy, though milk production from dairy cows may be lower than normal. There are mildly-deficient areas where definite symptoms of sickness are not apparent and mortality is negligible, but economic losses may still be very great, as sheep tend to be unthrifty, particularly from late spring to early autumn, and lambs are hard to rear.

Owing to the widespread use of cobalt bush sickness is now uncommon, but preventive measures must be continued if stock are to remain healthy.

Cause of Bush Sickness

The disease is caused primarily by a deficiency of cobalt in the soil and therefore in the pasture on which the animal subsists. Though only minute amounts of cobalt are required by stock, the content in pastures in some areas is inadequate.

The exact physiological function of cobalt is unknown, though there is some experimental evidence to suggest that cobalt is necessary for the proper functioning of certain bacteria in the rumen. It is supposed that these bacteria elaborate vitamin-like substances necessary for the well-being of the animals. Though it is certain that the mode of action of cobalt is complex, prevention of bush sickness is simply secured by making sufficient cobalt available to stock.

Affected Areas

Soils on which the disease occurs tend to be of a sandy, porous nature. High annual rainfall is also a predisposing factor. In past ages this has resulted in the dissolving out of cobalt from the topsoil, thus rendering the mineral unavailable for uptake by pasture plants.

In the North Island bush sickness is frequently associated with soils derived from volcanic ash showers, particularly pumice deposits. Pumice areas extend outward from Taupo to the Rotorua and Tauranga districts, parts of the Bay of Plenty district, Gisborne and Poverty Bay back country, parts of Wairoa and northern Hawke's Bay, and parts of the Taumarunui, Waitomo, and Waikato districts. There are indications of mild cobalt deficiency in parts of North Auckland, eastern Taranaki, Wanganui, and East Cape districts. A localised case of bush sickness has been observed on a limestone soil in the Wairarapa.

Though bush sickness in the North Island is commonly associated with pumice deposits, other soil types may be cobalt deficient. Conversely all farms on pumice country are not necessarily bush sick. Forest growth, climate, contour, and erosion have in many cases considerably modified the soil so that it has been rendered healthy.

Though there are no pumice areas in the South Island, bush sickness occurs on soils derived from coarse, crystalline granites in the Nelson Province. Some soils near Westport and Onekaka and in parts of the Grey-Reefton Valley are cobalt deficient, and there is evidence of deficiency on soils derived from coastal sand dunes at Karamea and Westport. In Southland cobalt deficiency occurs at Morton Mains on soils derived from glacial-rock flour or loess.

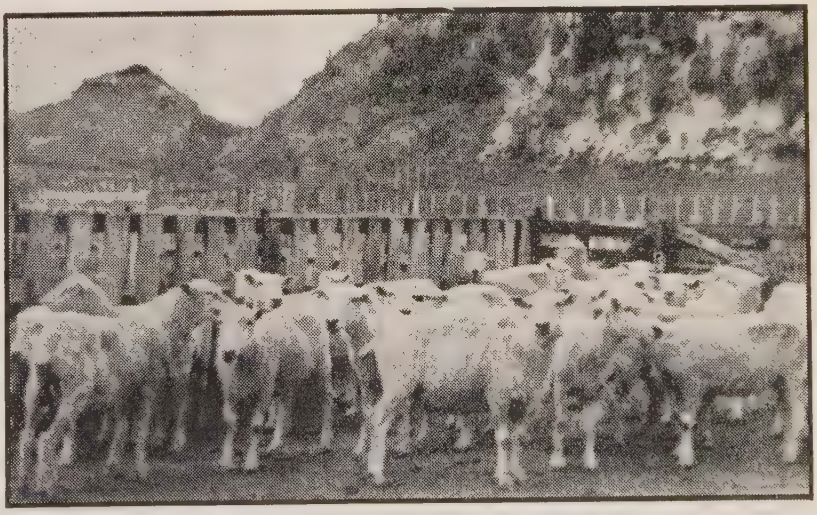
Areas liable to be bush sick are now fairly well defined, but in broad outline only. Examination of individual farms or even paddocks is necessary to determine whether such specific areas are cobalt deficient.

Diagnosis

In making a preliminary diagnosis the following points should be considered: Weaned lambs are most susceptible to cobalt-deficiency disease, next in order of susceptibility being mature sheep, calves from 6 to 18 months old, and mature cattle. Therefore, if weaned lambs and sheep show symptoms of unthriftiness, bush sickness may be suspected. However, if mature cattle are unthrifty while weaned lambs thrive, the ailment cannot be attributed to cobalt deficiency.

If cobalt deficiency is suspected, Veterinarians or Stock Inspectors of the Department of Agriculture should be consulted. If necessary, they will secure samples, preferably livers from affected animals, for forwarding to the Animal Research Station, Wallaceville, for chemical analyses. A low cobalt content of the sample would confirm the field diagnosis as cobalt-deficiency disease. Chemical analyses are not likely to be of use, however, where recent cobalt supplementation has been practised.

Cobalt supplements are of value only where there is a deficiency of the mineral. No benefit can be derived from its administration unless there is evidence that unthriftiness is caused by bush sickness.



Breeding ewes showing varying degrees of bush sickness. Prevention of the disease is simply secured by making sufficient cobalt available to stock.

Control of Disease

Bush sickness can be controlled by making cobalt available to stock in the following ways:—

1. As a drench,
2. As cobaltised licks, or
3. By enrichment of the cobalt content of pasture through topdressing with cobalt salts.

Except as a means of treating urgent cases of bush sickness, drenching as a large-scale measurement is not practicable economically. Licks suffer from the disadvantage that all animals do not consume them, and periodic labour charges are entailed in replenishing the lick boxes. They are, however, the only method where topdressing is at present impracticable, as on very hilly or inaccessible country.

The most convenient way of preventing bush sickness is to topdress with cobalt incorporated in superphosphate. For this purpose cobaltised superphosphate containing 6lb. of cobalt sulphate to each ton of superphosphate is available commercially. When the topdressing method is used the following points should be noted:—

1. Cobaltised superphosphate spread annually at the rate of 1cwt. per acre will afford protection against bush sickness.

2. A yearly application of more than 1cwt. of cobaltised superphosphate per acre is wasteful of cobalt. Where heavier superphosphate topdressings are required cobaltised superphosphate may be supplemented by ordinary superphosphate. For example, if the superphosphate requirement is 3cwt. per acre, 1cwt. of cobaltised superphosphate should be used, the balance being made up by 2cwt. of ordinary superphosphate.

3. Bush-sick paddocks topdressed at infrequent intervals need heavier applications of cobaltised superphosphate. For example, where topdressing is carried out only once in three years the requirement is at least 3cwt. per acre.

4. Cobalt can be mixed with other fertilisers such as lime. Though cobaltised lime is not available commercially, farmers should experience no difficulty in preparing their own mix at the rate of 3lb. of cobalt sulphate to a ton of lime. Two hundredweight of cobaltised lime per acre spread yearly will prevent bush sickness.

5. On farms subject to severe bush sickness every paddock should be topdressed with cobaltised fertiliser.

It is debatable whether higher prices justify a reduction in the use of ordinary superphosphate, but it is certain that reduced application of cobaltised fertiliser to bush-sick farms must result in serious economic loss.

More detailed information regarding bush sickness is available in Bulletin No. 180, "Cobalt Deficiency in Sheep and Cattle," which sets out the joint recommendations of the Department of Agriculture and the Cawthron Institute. This bulletin can be obtained free from any office of the Department of Agriculture.

CLEARING MANUKA FROM HILL COUNTRY

SCATTERED and thin manuka on hill country is usually cleaned up by being cut and left to lie and rot away, but where the growth has shaded the grasses out, and the ground is more or less bare under the scrub, resowing after burning should be the method used. The usual procedure is to cut the scrub in winter and early spring, when labour is available and conditions are good for this type of work, and leave it to dry out, usually until the following autumn. That method seldom gives a clean, hot fire, and the manuka starts growing again in the newly-sown grass.

A MUCH more reliable method of dealing with relatively-heavy scrub which warrants burning and the resowing of the land to grass is to time the cutting so that the cut growth can be burnt when it is red-brown and before the leaves fall to the ground. If cutting is best done in winter and early spring, the area should be burnt as early as possible in the spring and sown to grass seed immediately. This early burning gives a very hot fire which cleans up all seed on the plants and most of the seed on the ground, and, though autumn sowing may be best for the district, it will be found that in few districts are failures from spring sowing likely. Clovers especially do well when spring sown. Further, there is little danger of the fires spreading in spring.

If autumn sowing is considered essential, the manuka should not be cut until late summer so that the full leafage is still on the plants when they are burnt off.

Manuka is usually left for too long between cutting and burning. The difference between the strike of seedling manuka after a burn of material which has just turned red-brown and the usual heavy reseeding which follows burning of cut manuka which has lain for five or six months is so much in favour of early burning that it is remarkable that so much cut manuka is left practically to rot away before it is fired.

Cutting in winter—which is undoubtedly the best time—followed by spring burning and sowing, reduces the danger of fires spreading, gives a warm, moist seed-bed with several weeks of good growing conditions for the young grass, and, what is more important, reduces reseeding of manuka to a minimum.

—*C. J. HAMBLYN,*
Fields Superintendent,
Palmerston North.

FARM WORK FOR OCTOBER

By the Extension Division.

SEED CERTIFICATION

During spring and early summer the question of shutting up paddocks for the production of Certified seed is being considered by many farmers. The following notes are intended to assist those who are not fully acquainted with the certification scheme as it affects farmers generally.

First, it should be remembered that the object of seed certification is to ensure that the purchaser can buy seed of a known type or strain. Grasses and clovers covered by the seed certification scheme include perennial ryegrass, Italian ryegrass, short-rotation ryegrass, cocksfoot, browntop, timothy, *Phalaris tuberosa,* white clover, Montgomery red clover, cowgrass, and subterranean clover. Much of the seed that is now certified originates from material that has been selected or bred by the Grasslands Division, Department of Scientific and Industrial Research, at Palmerston North.

There are several classes of Certified seed, the significance of which is important more particularly to the seed grower than to the farmer who is sowing down a grazing pasture. The material produced by the Grasslands Division is known as "Nucleus Stock" seed. This in turn produces "Government Stock" seed, which is the produce controlled by the Department of Agriculture. In general Government Stock seed produces "Pedigree" seed, Pedigree seed produces "Mother" seed, and Mother seed produces "Standard" or "Permanent Pasture" seed.

Government Stock seed is supplied to the genuine seed-producing farmer, and Pedigree seed, which is more readily available, is intended for the farmer who normally produces seed under reasonable conditions. Mother seed is intended for the farmer who takes an occasional seed crop, and Standard or Permanent Pasture seed is intended for use as pasture rather than seed production. For grazing purposes Standard or Permanent Pasture seed on the whole is quite as good as any of the higher grades, but the higher grades are necessary to assure a continuous flow of high-class seed to the seed grower and ultimately to the grazier.

Closing dates for the acceptance of entries of crops subject to field inspection are necessary for two reasons. First, it is essential that crops be inspected at the correct stage of growth, which, of course, varies with different crops. Second, the field staff must be able to arrange what is often a very large programme of work. Late entries are accepted only at the convenience of the Department. The closing dates vary from district to district and from crop to crop, and full information is available from officers of the Department of Agriculture.

GRASS AND CLOVER SEED AREAS

The management of grass and clover seed areas is often vitally important in the production of a good yield of clean seed, and in October much can be done to improve the prospects for a good seed crop. Areas of perennial, Italian, and short-rotation ryegrass intended for seed should have all the stock that can be made available concentrated on them to clean up the areas and give them a good dressing of animal manure. Nitrogen is essential to rapid growth and the producing of tillers, and ryegrass will benefit considerably by this treatment. Areas should be ready for closing by late October or early November. In a cold, wet, spring, when growth tends to be slow and grass seed paddocks are yellowish about the end of October, dressing of sulphate of ammonia at the rate of 1 or 2cwt. an acre, applied just when the ryegrass begins to shoot, has been found to give really worthwhile results in increased seed yield. Applied at this time, the nitrogen in the fertiliser brings up the seed heads to flowering very quickly, and many tillers which would not produce anything under the adverse conditions will grow into mature seed. Crops so treated have given up to double the yield of untreated areas.

Red and white clover areas for seed in districts where leaf growth tends to be heavy are best closed before the end of October for a hay crop, being closed again before Christmas for the seed crop. If the hay and threshed straw are fed back on to the area later in the winter, this treatment is not very detrimental to the area and usually gives a better crop of flowers which bees and other insects can work and pollinate better than where the crop is very leafy.

LUCERNE

The area in lucerne continues to increase in parts of the South Island where its value as a green supplementary feed in a dry season is appreciated, as well as the fact that lucerne provides some of the best fodder, in the form of hay, which can be grown. In the North Island, though recent droughts in many areas have demonstrated the need for some such green summer fodder, lucerne growing has not made the progress which might be expected. The reason may be that lucerne has been looked on and used mainly as a winter feed producer for both hay and silage, and in good grass-production seasons the lucerne crop is likely to be embarrassing. Where conditions are usually too dry for good green pasture growth almost every summer, as on much of the lighter pumice, sandy, light volcanic, and similar soils, lucerne could well be grown more extensively, not to replace the hay and silage that can be cut from pastures, but to provide greenfeed from January to March and even later in northern districts. Possibly where lucerne really does well it could be grazed off in breaks instead of being cut and carted out during its main growing period. A good stand of lucerne should be invaluable to dairy farmers, and particularly to whole-milk suppliers, during this period.

Lucerne is usually sown in November or late October, and areas intended for this crop should be almost ready for sowing now. Weeds should be controlled as they germinate by frequent harrowing and, where necessary, by discing. This cultivation to control weeds and help consolidate the lower parts of the seed-bed should be continued right up to sowing time. Arrangements for seed and for its inoculation should be made in good time so that advantage can be taken of favourable weather for seeding.

CEREALS

October is a busy month for the preparation of land for all kinds of crops. Most spring wheat sowings will be completed by the end of September, though in some of the higher-rainfall districts sowings may be continued into October. For such late sowings the variety Tainui should be used, as it is one of the quickest-maturing varieties and can be expected to give a better yield than others when sown late. Spring sowings of barley and oats may be made this month in some areas. In all cases seed-beds for cereals can be worked down finer than is advisable for autumn or earlier-spring seedings.

Maize land in the main grain-growing areas is generally ready for sowing the crop this month, and experienced growers aim to have the crop in and up before the end of October. In America the new selective hormone weed-killers are being used effectively on this crop, and expert advice on the possibilities of these materials in keeping the growing crop free from weeds should be sought from local offices of the Department of Agriculture.

LINSEED AND PEAS

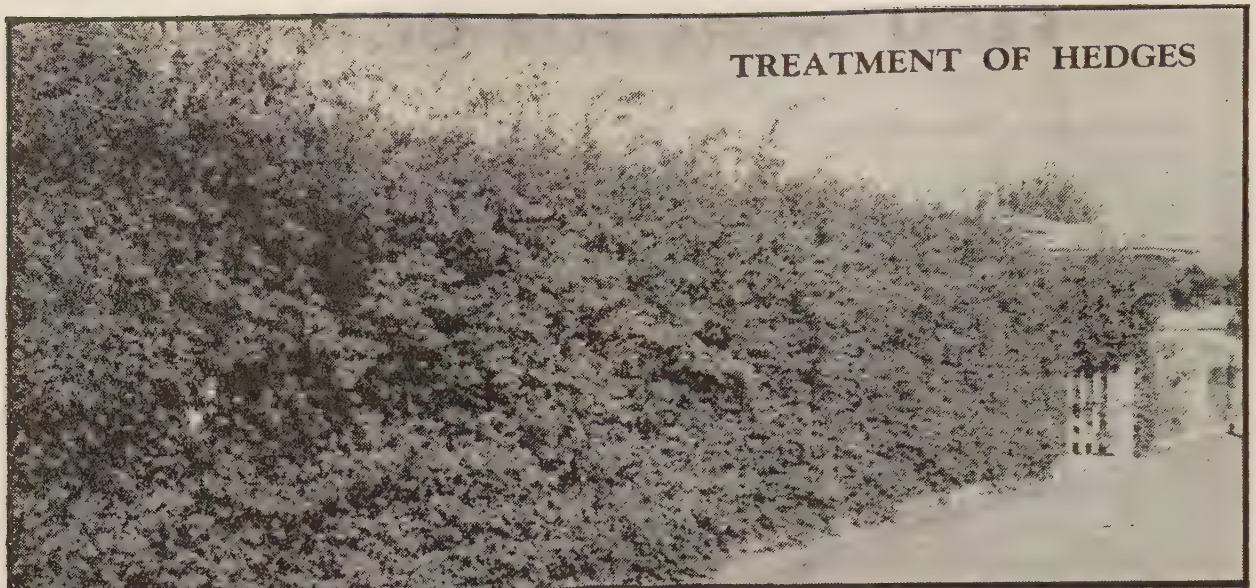
Land intended for linseed and peas should also be nearing final cultivation preparatory to being sown. Selective weedkillers are being used very successfully with both these crops where weeds are prevalent, and advice on this subject should be sought from offices of the Department.

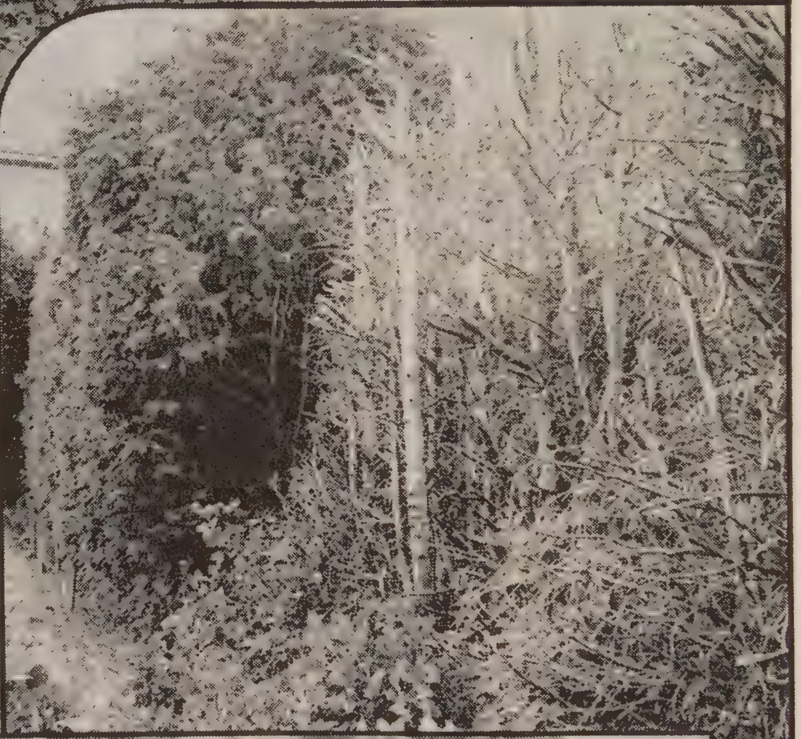
FODDER CROPS

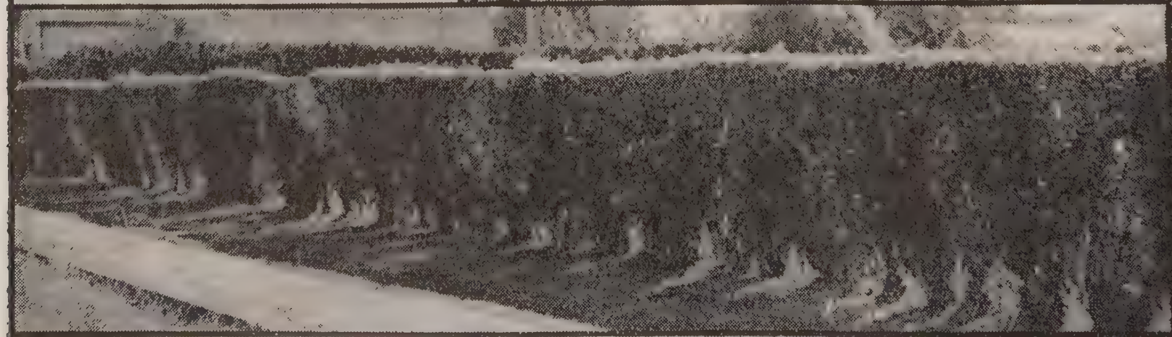
Work in the preparation of land for such crops as turnips, rape, chou moellier, kale, and swedes must be speeded up as the weather becomes more settled in October, though swedes are usually the last to be sown. Rape, soft turnips for summer feed, chou moellier in northern districts, and lupins can be sown this month, it being a good idea to sow such summer greenfeed or fattening crops in breaks at intervals of 10 days to a fortnight.

The preparation of potato land should be well forward. The aim of cultivation for this crop should be a crumby, friable structure in the soil to the full depth of the cultivation, as the potato, being a stem and not a root formation, likes an open-texture soil.

TREATMENT OF HEDGES







Above—Flowering hedges cannot be kept as closely trimmed as others or the beauty of the flowers will be largely lost. Hedges of species such as *Abelia chinensis (floribunda)* should be left to grow through the summer but should be cut back hard immediately flowering has finished. Right—Overgrown hedges of *Cupressus lawsoniana* and most other conifers cannot be renovated by cutting them back hard, which will only kill them, leaving the ugly dead branches seen far too commonly in New Zealand gardens. Below—This boxthorn hedge has become gappy at the bottom through the top being pruned wider than the bottom.

[*Top and bottom photographs by News-Photo Service; middle photograph by Photo News Ltd.*

Well-kept Hedges Give a Finish to the Garden

[*News-Photo Service photo.*

Well-trimmed hedges add dignity to any garden frontage. This one is of golden ake ake.

GARDEN hedges provide the frame and background for the picture made by borders, lawns, and dwellings, and the proper maintenance of hedges is always important. This year home gardeners throughout the Dominion are paying special attention to their hedges and frontages in view of the impending Royal visit. Advice on maintaining and trimming hedges is given in this article by J. P. Hudson, formerly of the Horticulture Division, Wellington.

IN many gardens, especially in exposed places, the success or failure of the flower borders depends on the provision of proper shelter, and hedges may also serve as screens to give some privacy in the garden or as boundary fences to keep out domestic animals or stock. Inevitably, hedges are very conspicuous features of the garden, forming the setting and background against which all the other features are seen. Untidy or badly-grown hedges can spoil the appearance of any garden, however well cared for the lawns and borders may be, yet many gardeners take more pride in their borders than in the surrounding hedges.

It is probably a case of familiarity breeding contempt. Householders become so used to the normal surroundings of the home that after a time they do not even see them. Small details, not obvious to the casual observer, assume importance and are noticed at once, but the major features of the garden make hardly any impression on the consciousness. It is a good thing, every now and then, to step outside and see the home and garden as the casual passer-by sees them.

[*Sparrow Industrial Pictures Ltd. photo.*

Hedges with shaped tops are not easy to keep trim and should be attempted only by gardeners who have plenty of time and a "good eye."

The first thing to notice is the hedges. Are they uniform or uneven and gappy? Have they become too tall and out of proportion to the garden? Are they still growing well, or have they become starved, unthrifty, or diseased? Are they well maintained, a credit to the garden and up to the general standard of the street or road frontage, or do they clash with the neighbours' hedges and spoil the general effect? An honest answer to some of those questions may show that the hedge needs attention, especially if it is some years old.

Routine Hedge Maintenance

Hedge plants, like any others, respond to good treatment. There is no point in being overgenerous and making hedges grow too strongly, as that only makes more work in clipping, but hedge plants must be kept growing actively if the hedge is to look fresh and attractive. Moribund hedges which have almost ceased to produce new growth soon look extremely dingy.

Routine maintenance of any hedge should include at least an annual clean-up of the hedge bottom, when dead branches should be cut out and rubbish, weeds, and dead leaves and twigs should be collected and put on the compost heap. The ground should then be lightly worked over with a fork or hoe, but without disturbing the roots which lie near the surface.

Regular clipping removes a great deal of plant food from the soil. If the clippings are composted, the food may not be entirely lost to the garden, but the soil on each side of the hedge becomes depleted of plant food and hedges commonly suffer from starvation.

If the new shoots are sparse or thin or the new leaves are a poor, dull colour, these should be taken as signs that the soil is becoming impoverished. This should be remedied by dressing a strip of ground a few feet wide on each side of the hedge with the complete flower border fertiliser (three parts of blood and bone, two parts of superphosphate, and one part of sulphate or muriate of potash) at the rate of 2oz. a square yard. The dressing is best applied in spring and hoed or raked in. An annual dressing of well-rotted compost, applied to the soil for two or three feet on each side of the hedge every spring, will also be most beneficial, helping to keep the soil in good physical condition.

Effect of Continual Clipping

The immediate and most obvious effect of clipping is to thicken the hedge. Usually a new shoot on a tree or shrub grows quite long before it produces side branches.

and these normally grow from near its base, but the effect of removing the growing point is usually to cause one or more of the buds just behind the cut to grow. Thus clipping increases the number of new shoots, and the more often clipping is done the thicker the tangle of shoots becomes, provided that each cut is made a little outside the previous one. If the hedge is cut harder (that is, nearer to the centre line) than has been done before, a considerable number of new branchlets will be cut off and the hedge left more open than it was before being clipped.

Therefore, the most important rule in clipping hedges is to clip often and regularly, but not harder than before unless the hedge is to be renovated.

Shapes of Hedges

The second rule is to keep the top narrower than the bottom. The upper branches of trees and shrubs tend to reach continually outward and upward, bearing their leaves up into the light. In this process the lower branches and leaves of most plants become overshaded and in due course die, but that would be disastrous in a hedge, which should remain well clothed with leaves right down to the ground.

The natural tendency for the lower leaves and branches to be overshadowed can best be overcome by pruning the upper branches harder than the lower ones, thus keeping them in check. A hedge should never be wider at the top than at the bottom. Keeping the base of a hedge well clothed is often difficult even when the hedge has parallel sides, with the top the same width as the bottom, and the best design for a hedge is for it to narrow slightly but regularly from base to top.

Another reason why hedges should be clipped often is that there is a relationship between the quantity of water taken from the soil and the total length of the shoots. If hedges become very overgrown before they are clipped, they probably take up much more water from the soil than if they are kept cut closely. That is important if the hedge adjoins flower borders, where the hedge and flowers are in keen competition for water from the soil in dry weather, and a reduction in the hedge requirements means more water for the flower plants.

Building up the Bottom

The third rule is not to let young hedges grow up too quickly. Gardeners may be impatient for shelter or privacy, but the young shoots growing upward should be shortened substantially at each pruning to ensure that the hedge fills in the bottom with bushy branches as it grows. If the young shoots are left unpruned to gain height more quickly, the resulting hedge is likely to be open at the bottom.

The main aim of the early management of hedges should be to build up a dense bottom. This is done by pruning the young plants quite hard immediately after they are planted and by frequently shortening the shoots which are growing upward during the first two or three years after planting.

When to Trim

Good hedge plants are those which respond best to close clipping by producing new shoots freely. The more often these plants are clipped the better hedge they make, and that applies specially in their first few years, when frequent clipping encourages the bushy, much-branched foundation that is necessary for a first-class hedge.

On the other hand, home gardeners are usually busy and certainly have no

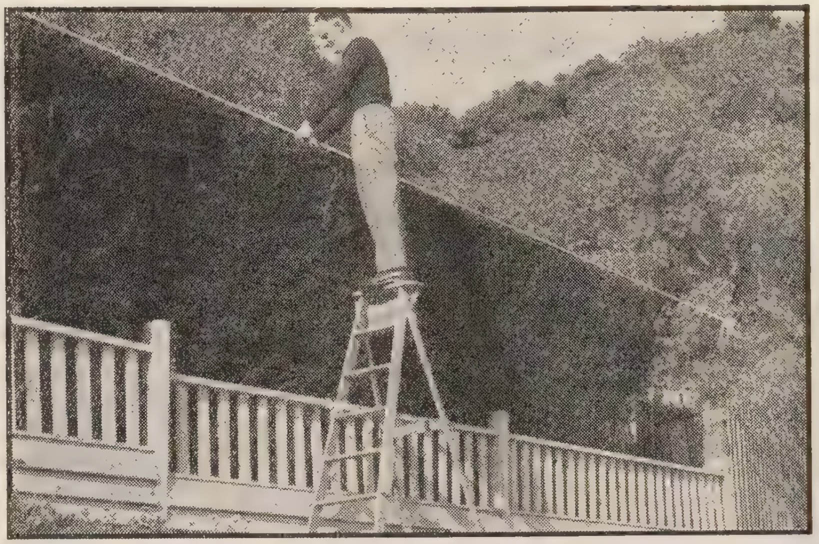
HEDGE-CLIPPING CHART

Variety	When and how to trim	Can an old evergreen hedge be renovated by cutting it back hard?
Abelia chinensis (*floribunda*)	Once, immediately after flowering	
Acacia verticillata	Twice, summer and autumn	
Broadleaf	Twice, summer and autumn	Yes
Berberis vulgaris	Once, after flowering (if grown as flowering hedge)	Yes, excellently
Coprosma baueri (taupata)	Once a year in summer	Moderately well
Cupressus lusitanica var. *benthami*	Once or twice, in spring and autumn	No; will die if cut back into old wood
Cupressus lawsoniana		
Cupressus macrocarpa		
Cydonia japonica	Once, in autumn	
Elaeagnus japonicus	Very frequent clipping	Yes, excellently
Escallonia exoniensis	Two or three times, in spring, summer, and autumn	Yes, but odd plants are likely to be attacked and killed afterward by silver blight
Escallonia macrantha		
Fuchsia riccartonii	Once, after flowering	Yes
Olearia forsteri (golden ake ake)	Twice, in summer and autumn	Not always
Hawthorn	Twice, in summer and autumn	Yes (liable to fireblight)
Holly	Once a year, in summer	Yes
Laurel	Once or twice, in spring and autumn	Yes, excellently
Lonicera nitida		
Ngaio	Several times a year, when untidy	Yes
Olearia traversii	Twice, in spring and summer; burn all prunings to kill gall midges	Yes
Phebalium billardieri	Twice, in summer and autumn	
Pittosporum crassifolium (karo)	Once or twice, in summer and autumn	Not always
Pittosporum eugenioides		
Pittosporum tenuifolium		Not usually
Privet	Two or three times, in late spring, summer, and autumn, or more often if necessary	Yes, excellently
Rosemary	Once a year, after flowering	Yes
Tecoma capensis	Twice, in summer and autumn	Yes
Tree lucerne	Several times a year	Yes, but likely to die out after pruning because of attack by silver blight
Yew	Once or twice, spring and late summer	Yes (an exception to the rule about conifers)

time for unnecessary hedge clipping. Therefore, a balance must be struck between clipping too often, which is a waste of time, and not often enough, which results in a loose, open hedge, often with bare patches, and usually leads to the hedge becoming too big.

As a general principle, the main pruning should be given in late summer or early autumn, when the season's growth has almost ceased. After this pruning the hedge will usually stay tidy through the winter until late spring or early summer, by which time abundant new shoots will be growing. These should be trimmed just before they finish growing, from late spring to midsummer, depending on the species. The crop of shoots which will then grow should be trimmed in late summer or early autumn, and so on. Those recommendations may have to be varied for different species, depending on the season during which they make most growth, and one or two extra clippings may be required to maintain neat hedges of very rapid-growing species like eleagnus. Detailed suggestions for the time and frequency of pruning the main hedge species are given in the list on the opposite page.

Cydonia japonica and *Tecoma capensis* are almost the only species of hedge plants that will flower on formally-clipped hedges. The great majority of species used for flowering hedges, including barberries, lilac, fuchsias, and abelias, should be cut back fairly hard after the flowers are over but otherwise not pruned at all.

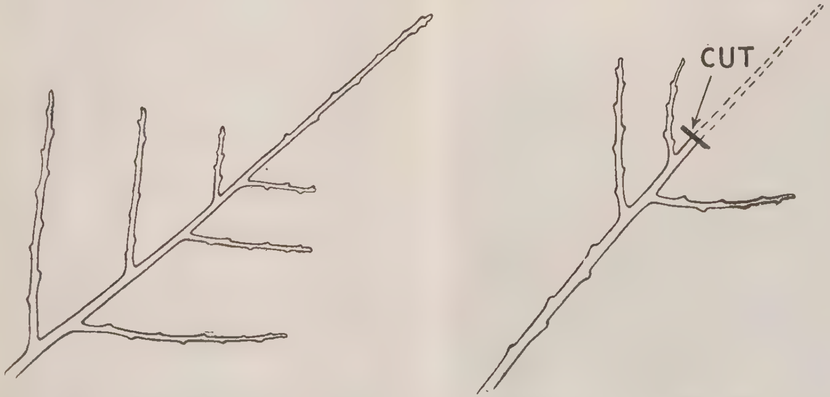


Substantial windbreaks are very necessary in exposed places, and tall hedges give much-appreciated privacy to the garden, but hedges which become overgrown are a nuisance to trim and may even become a menace to health. There can rarely be any justification for hedges as high as this one, which can be kept neat and tidy only at the risk of a nasty fall. If steps must be used, ensure that they are level and securely braced and that each leg is standing on a solid base. Never try to reach too far, and where necessary lash the steps to some support. Always use a cord when clipping a hedge to a new level or line.

Methods of Trimming

Flowering hedges, and those with very large evergreen leaves, such as laurels, should be trimmed with a knife or secateurs—that is, pruned rather than clipped. If shears are used on the latter type of hedge, the many leaves which are cut through develop a brown, withered edge and look dingy, quite apart from the unpleasing appearance of the mutilated leaves. Garden shears are ideal for clipping other types of hedge provided they are kept in good condition by sharpening and oiling. Shears should be sharpened to a thick edge, like scissors, and not to a knife edge. Blunt shears are inefficient, are tiring to use, and damage the plants by pulling or bruising the shoots instead of leaving a clean cut. Electric or motor-operated shears are a fine investment for gardeners who have to maintain a great length of hedge.

There is a distinction between the training of a new hedge, bringing it up to its proper height and shape, and the maintenance of it in that condition.



The normal habit of a shoot is for the basal branches to occur when the main stem has made considerable growth (left). The effect of removing the tip by clipping is to encourage new shoots to grow from immediately behind the cut. The best hedge plants are those that can be thickened up most easily by regular clipping.

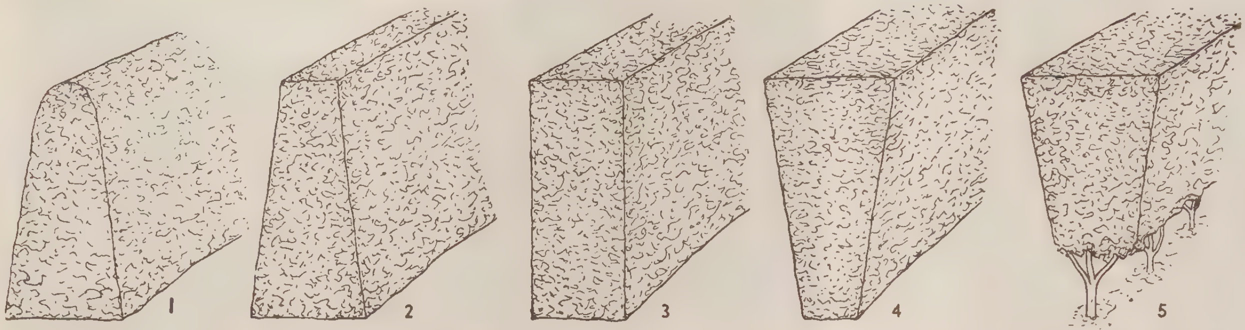
Few home gardeners have an accurate enough eye to train a hedge dead level and straight, and it is always worth while to use a cord for the purpose, strung tightly in place, tied at each end to a pole thrust through the hedge, and fastened back to a peg in the ground. First clip along the line until no branch or leaf is quite touching the cord anywhere along its length. The line is then bound to be straight, and clipping can proceed vertically and horizontally from it.

When a hedge has been clipped to a line for a season or two its contour and outline will be well established and the cord will no longer be required. Each time the hedge is clipped it should be cut back as close as possible to the former outline. After clipping the tops and sides always "sight" along them to see if any slight irregularities can be repaired by further clipping.

The results of few tasks can give the home gardener so much quiet satisfaction as a really well-trimmed hedge, true, level, and square. It is worth while to take some trouble over this work and to remember that a hedge can always be gone over again to take off a little more where necessary, whereas nothing but time can bring up the level of a place that has been cut too hard.

Renovating Old Hedges

By following the rules given the hedge should become more and more dense until it is an impenetrable tangle of new shoots, but inevitably it



The shape of a hedge and the regularity with which it is clipped largely determine whether it will become open and gappy at the bottom. The ideal is to prune hedges in a tapering shape, slightly narrower at the top than at the bottom (1 and 2). Whether the top is rounded or square is immaterial, but cutting a square-topped hedge accurately is easier. Parallel-sided hedges (3) can be kept well clothed by careful management, but hedges wider at the top than at the bottom (4) are extremely difficult to maintain. This shape usually results in the branches at the bottom dying out and leaving it bare (5).

becomes slowly taller and wider as each clip is made slightly outside the previous one. The closer each clip is to the previous one the more slowly the hedge increases in size, and one of the signs of a hedge expertly maintained is that it increases in size only very slowly. Even so, in time hedges become overgrown and out of proportion, or start to cast too much shade on borders or house. When that happens some types of hedge can be reduced in size, but others cannot. For instance, pines, species of cupressus, and most other conifers will die if cut back hard. The only way to keep coniferous hedges in bounds is to cut them very frequently and never let long shoots grow.

On the other hand some species, such as escallonias, recover well from hard pruning if it is not all done at once. One side of an escallonia hedge can be cut back hard, then a few months later, when new shoots have started to grow from the bare branches, the other side can be cut, and finally the top. It is not wise to cut down old escallonia hedges to their stumps, as not all grow, and very drastic reduction of this type of hedge is best spread in stages through two or three seasons.

Hedge plants of a third group, including privet and laurel, have an extraordinary power of regeneration. Even if the plants are sawn off, leaving only the main stumps a few inches above ground, they will throw out numerous strong shoots that can soon be trained into a new hedge. Heavy cutting of hedges for renovation is best done in spring to give plants the full benefit of a long growing season in which to recover.

The mechanics of regeneration are interesting. Every leaf of every shrub and tree has a bud in its axil (the angle where the leaf stalk joins the stem). Though relatively few of these buds ever develop into shoots, most of them remain alive but dormant, and if a branch is cut back hard, some of these dormant buds may start to grow and produce new branches. On the other hand, if plants such as privet and laurel are cut back hard, not only may dormant buds grow, but completely-new buds ("adventitious buds," or those not produced normally in the axils of leaves) are also produced in abundance.

Most conifers cannot produce adventitious buds, and their dormant buds soon die; hence their inability to produce new shoots from old branches.

[*Photo News Ltd. photo.*

A badly-overgrown escallonia hedge has been cut hard back on one side. When this side has recovered and is clothed with new shoots the top and the other side will be cut back..

Refilling Gaps

Hedges may become gappy for several reasons. Odd plants in the row may die out, thin places may develop because of overhanging trees throwing too much shade over the hedge or robbing it unduly of moisture, or rampant weeds growing in a hedge may cause gaps for the same reason.

Nothing is more annoying or unsightly than when one or two plants die in a well-established hedge. Repairing these gaps and building up a uniform hedge again is not easy. A tendency to die out (now showing, for instance, in escallonias) can be regarded as the worst possible fault in a hedge plant, and in itself is enough to condemn a species as unsuitable for the purpose.

Where gaps are caused by plants dying out it is usually best to replace the dead plants with some species more likely to survive, and appropriate action can be taken where overhanging trees, or weeds, are the cause of thin places. Though no hedge plant thrives immediately under an overhanging tree, abelia or privet does better than most species in a shady place. Thin patches or gaps in a hedge can sometimes be reclothed, without drastic renovation pruning, by selecting strong shoots from each side of the gap and threading them into the gap or tying them together to form new main branches, from which side shoots will fill the gap or thicken up the thin place.

WORK FOR THE FLOWER GARDENER IN OCTOBER

The important operations of sowing, pricking out, planting out, and potting on will absorb much of the home gardener's time and interest in the flower garden in October.

Annuals must be given ample room in which to grow if every plant is to make a long display of flowers. As soon as the seedlings can be recognised they should be thinned to an inch or two apart, using the thinnings to plant up any gaps where seeds failed to grow. Later, the young plants should be thinned to a minimum of 8 to 9in. apart for dwarf varieties like alyssum and nemophilas, and tall, vigorous annuals such as lavatera and godetias should be thinned to at least 18in. apart. Intermediate varieties like cornflowers, love-in-a-mist, and pot marigolds should each be given 10 to 12in. of space. Make sure slugs and snails have been controlled before thinning annuals; baits containing metaldehyde are by far the most effective against these pests. Unless the border is well sheltered it is worth while to intersperse the plants with twiggy brushwood which will serve to support them in high winds, but stakes and ties generally look out of place in annual borders.

Bedding plants, especially tender varieties like petunias and salvias, can continue to be planted out in the cooler districts as soon as there is a reasonable chance of no further serious frost. A good display of flowers by Christmas is unlikely if planting has to be delayed much longer. The boxes of plants should have been thoroughly hardened off in a cold frame or under a hessian cover before being planted, as well-hardened plants are less likely to be damaged by a touch of frost than soft plants brought straight out from a glasshouse. Plants like zinnias and nemesias that need a relatively-high temperature should still not be planted in cold districts. Further plantings of all the hardier bedding plants can still be made and are most useful for filling gaps left as the growth of flowering bulbs declines in the mixed flower border. Always water boxes of bedding plants thoroughly a few hours before they are planted out; plants can be lifted from moist soil with less damage to their roots than if the soil is dry.

Biennials such as Canterbury bells, forget-me-nots, and sweet williams can be sown now outdoors in boxes or in beds, but later sowings are preferred for wallflowers in most districts. Iceland poppies can also be sown in boxes, but most gardeners prefer not to sow until later.

Bulb foliage now begins to look overgrown and untidy, but should not be cut off until it changes colour. Some tidying up can be done, and tangles of leaves that are interfering with the growth of other plants, especially small bedding plants, can be trimmed a little or tucked out of the way. In northern districts leaves of the early varieties of narcissi will be changing colour and where the bulbs are to be left in the border the leaves can be cut off to ground level or gently pulled from the bulb. The soil should then be pressed firmly over the bulbs to discourage bulb flies from crawling down the holes left by the leaves and laying their eggs on the bulbs; from these eggs destructive caterpillars hatch and feed on the bulbs, which are ruined. If the bulbs are to be lifted, this may be done as soon as the leaves have changed colour substantially, and the gaps may be dressed with fertiliser, forked over, and planted up with bedding plants.

[*Douglas Elliott photo.*

The cinnamon wattle *(Acacia leprosa)* is an unusual small tree, growing to about 10ft. high and bearing scented foliage that looks very much like willow leaves. It is suitable for growing in the warmer parts of New Zealand.

Chrysanthemums should now be planted out in all but the coldest districts, if that has not been done already. Last year's roots can still be lifted, divided, and rooted pieces replanted provided the new shoots are not more than a few inches long. In mixed flower borders it is best to set out chrysanthemums in clumps of three or four plants of the same variety, 15 to 18in. apart in the clump; that ensures that each group of plants will make a vivid splash of colour in autumn. Chrysanthemum plants that have been grown in frames should have their tops nipped off 6 to 8in. above the ground to make them branch out into bushy plants with a number of main stalks. The best time to put in a stake for each plant is when they are first set out, but it is common practice not to do so until later, as stake and plant look out of proportion at planting time. However, if staking is not done now, it should not be delayed too long. It is always best to tie a plant while it is young and not run the risk of its being damaged by wind.

Composts for seed sowing and potting, made up to the John Innes formulae (detailed on page 93 of the "Journal" for July, 1947), give outstanding results, but their full value will be obtained only if the correct ingredients are used. In some districts home gardeners may have difficulty in procuring exactly the right types of loam and sand, and at present no really suitable grade of peat is on the

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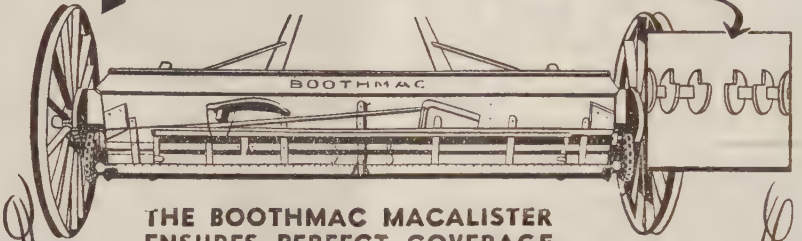

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WORK IN THE FLOWER GARDEN

[Douglas Elliott photo.

A number of splendid, showy, spring-flowering shrubs have been evolved from the common native manuka, and plant-breeding work in America promises other and even finer varieties. One of the best garden varieties available so far is *Leptospermum scoparium martini*, with large, handsome, pink flowers. The manuka varieties cannot stand severe frosts, but can be grown in all relatively-mild districts.

market in New Zealand, but there is little doubt that suitable loams, peats, and sands could be found in New Zealand and marketed for the benefit of home gardeners. To help in finding these ingredients the John Innes Horticulture Institution, London, is kindly supplying the Horticulture Division with samples of what are considered ideal loams, peats, and sands for use in the John Innes composts. The attention of nurserymen and seedsmen will be drawn to these samples so that correctly-constituted composts can be made up by the trade for sale to home gardeners. Meanwhile, a collected edition of the John Innes leaflets, entitled "The Fruit and the Soil," is appearing in bookshops in New Zealand (price 5s. 3d.); it contains some very valuable information for commercial growers on soil sterilising and composting.

Cuttings root best if they never flag. The best way to prevent their leaves from flagging is to put them in a frame where a moist atmosphere can be maintained by keeping the light shut and damping the cuttings over daily with a watering can fitted with a rose. As soon as the cuttings begin to grow, as shown by the brighter colour of the young central leaves, the frame light should be opened a little and the atmosphere kept much drier or the cuttings will grow soft and drawn.

Dahlias may be planted out in districts not subject to late frosts, but elsewhere it is safest to keep the plants in a frame until late October or early November, as dahlias are particularly susceptible to even light frosts. Plants growing in frames should be hardened off thoroughly ready for planting, using the glass light or hessian covering only when the weather is cold. Set out dahlias from 18in. apart for bedding and short types to 3 to 4ft. for giant decorative and show varieties.

Fuchsias should be pruned in cold districts, being cut back hard to encourage new growth. In very cold inland places, where unprotected fuchsia bushes will not survive the winter, the covering of soil, sand, or straw put over the crowns in autumn for protection against frost should now be removed.

Geraniums, more or less dried off and wintered in frames or frost-free sheds in very cold districts, should now be started into growth ready for planting later in October or November. As soon as buds and shoots start to grow, the plants should be pruned hard to form shapely little bushes and encourage strong new branches. All old dead leaves, especially those bearing the spots of geranium rust, should be collected and burnt to reduce risk of the new plants being affected.

[Douglas Elliott photo.

***Cornus capitata*, formerly known as *Benthamia fragifera* and often called the strawberry tree, grows into a handsome, shapely, evergreen tree up to 20ft. high, covered with creamy-white flowers in spring and with fruit somewhat resembling strawberries in autumn.**

Gerberas are usually increased by lifting the roots in spring, dividing them into pieces each with at least one bud, and replanting them with the main bud at about ground level.

Herbaceous plants such as lupins, delphiniums, pyrethrums, geums, hollyhocks, and anchusas can be raised from seed, though named varieties must be propagated vegetatively. Seed may be sown now in beds outdoors, or in boxes or pots if only small numbers of plants are required. Young shoots taken now from growing plants of most of these varieties will root readily as cuttings in a cold frame.

Insure against a dearth of flowers in late summer by planting plenty of pelargoniums, geraniums, gaillardias, pot marigolds, marguerites, coreopsis, hybrid brooms, Spanish brooms, catmint, hybrid wallflowers, purple alyssum, and gerberas (in warm districts). If these can be established in spring, they will have flowers through the hottest, driest months of late summer. In cold districts delay planting tender types like geraniums and pelargoniums until next month.

Ixias are among the few flowering bulbs that need staking, and it is well worth while in windy places to give these graceful flowers the support of a thin stick and tie before the flowers

[Douglas Elliott photo.

Wistaria is one of the finest spring-flowering climbing plants for training over pergolas and verandas.

open. The best way to use the decorative effect of ixias is to plant the bulbs an inch or so apart in a fairly dense clump and tie the whole clump with one string to a thin stake about 12in. above the ground.

Lawn edges should be cut carefully with a line every spring, making the cut at an angle of 45 degrees away from the grass to ensure a strong edge that will not break away readily if trodden on. Frost causes the soil to crumble, and in cold districts the spring trimming should be delayed until the frosty weather is over. Especially at this time of year, removing the grass mowings is very important. They make a useful addition to the compost heap and, apart from that, they often contain seeds of *Poa annua*, the annual meadow grass which is such a nuisance in lawns because of its habit of dying off in summer. Every home gardener should have a pick-up bag on his lawn mower so that mowings can be collected.

Lawns: What makes a good garden lawn? Research by the Grasslands Division, Department of Scientific and Industrial Research, has shown how lawns composed entirely of fine grasses can be produced and maintained by suitable management, details of which are referred to in these notes at the appropriate times of the year. Lawns managed in this way are hard wearing and incomparable while growing, but brown off during long dry periods in summer, though the grass grows again as soon as the soil is thoroughly wetted by autumn rains. Recently a reader of these notes questioned whether a fine-grass lawn was really best for home gardeners, saying: "We don't want a brown bowling green round the house in summer, but a lawn that stays more or less green and cool-looking all through the hot weather." That is a thought-provoking statement. Experience has shown that clovers stay green in a lawn longer than grasses, while yarrow stays green and fresh through the longest dry spell, and a lawn containing these plants comes much nearer to being evergreen, even if it cannot be watered in dry weather, than one composed entirely of fine grasses. An old gardener with whom this was discussed recalled that at one time every lawn mixture contained some yarrow, which is especially useful on dry banks or open sandy soils. Rosette weeds like dandelion, plantain, catsear, and daisies must be removed if a lawn is to be at all pleasing, but the question of whether to encourage clovers and yarrow is worth serious consideration.

[Douglas Elliott photo.

The striking flowers of *Magnolia parviflora* have white petals and red centres and are sweetly scented. The species makes a loose, open tree up to 18ft. high.

Pot plants now growing strongly should be fed regularly with a suitable fertiliser such as a mixture of six parts of sulphate of ammonia, three parts of superphosphate, and one part of sulphate or muriate of potash, mixed with its own bulk of dry sand and used about once a fortnight at the rate of ½ teaspoon for each plant in a 5 or 6in. pot, or a level teaspoon for each plant in a bigger pot. Alternatively, liquid animal manure diluted to the colour of weak tea can be used.

Rhododendrons which form seed should be looked over after the flowers fade and all developing seed pods picked off. An old, overgrown bush can be renovated by cutting it down hard, even nearly to the ground, as soon as the flowers are over; that involves the sacrifice of next year's flowers, but adventitious shoots will grow from the old stump and soon build a shapely new bush. The soil must be watered from time to time to prevent it from drying out around branches layered earlier in the year.

Sow zinnias and other tender annuals in late districts in heated glasshouses to make plants for setting out next month. However, in cold inland gardens where the interval between late-spring and early-autumn frosts is relatively short, and where no heated glasshouse is available, it is probably best to buy well-hardened bedding plants from a nurseryman toward the end of the month rather than try to raise them at home; by the time home-raised plants are ready they will not have time to produce a good display before they are cut down again by autumn frosts.

Sweet peas, which should now be growing strongly in all but the latest inland places, can be trained in several different ways. The natural method is least trouble but produces much poorer results than the regulated-bush system, in which plants are allowed to climb naturally but a proportion of new shoots is removed to prevent the plants becoming too tangled. The cordon system, in which several stems from each plant are trained separately, is probably the most satisfying for the keen gardener who is prepared to give some time to his sweet peas in return for a long succession of lovely, well-formed flowers with long stems. The single-stem system may be followed by show enthusiasts who gain their satisfaction from producing few but perfect flowers. These systems were explained in detail on page 616 of the December, 1947, issue. A few seeds can be sown to supply a late display of flowers.

Other Work for the Month

The weekly removal of dead flower heads is one of the most important tasks in the garden.

Sow **anemone** seed in boxes.

Seeds of hardy **annuals** can still be sown, as described last month.

Rooted cuttings of **begonias** and **gloxinias** should be potted into 3in. pots.

Pot up a few plants of **chrysanthemums** for flowering in the house in autumn. Put three plants in a 4 or 5in. pot.

Dress all borders with **complete flower border fertiliser** if that has not been done, especially where dahlias, chrysanthemums and bedding plants are being planted out (see page 411, April, 1948, issue).

Pot on young **cyclamen** into larger pots as necessary, and gradually dry off those going out of flower.

Stems of **forsythia**, cut in bud, will open their flowers well in winter in the house.

Plant out more **gladioli** for succession (see last month's notes).

Stake early-flowering **herbaceous plants.**

This is a good time to look at bearded **irises** in flower at the nursery and decide what to buy later when planting time comes.

Prune **jasmine** hard after it has flowered.

Stake **madonna lilies** (*Lilium candidum*).

Lift, divide, and replant **polyanthus** in early districts as they finish flowering. If they were mixed plants, raised from seed, propagate only the best, which should be marked for the purpose before they finish flowering.

Lift, divide, and replant **violets** in good, rich soil.

Pull out **wallflowers** and **forget-me-nots** as they become straggling and go out of flower.

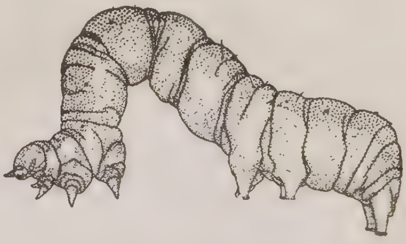
Reminders About Common Troubles

Greenflies usually appear at about this time of year on a variety of garden plants, including roses, pot marigolds, and pelargoniums. Keep a sharp look-out for the first sign of these pests, then spray on a warm day with nicotine sulphate ($\frac{1}{2}$ fluid ounce to 2 gallons of water), made more effective by adding 1oz. of soft soap or soap powder or, preferably, 3 fluid ounces of summer (white) oil emulsion. Repeat two weeks later to kill the few young greenflies which usually manage to survive the first application.

[*Douglas Elliott photo.*

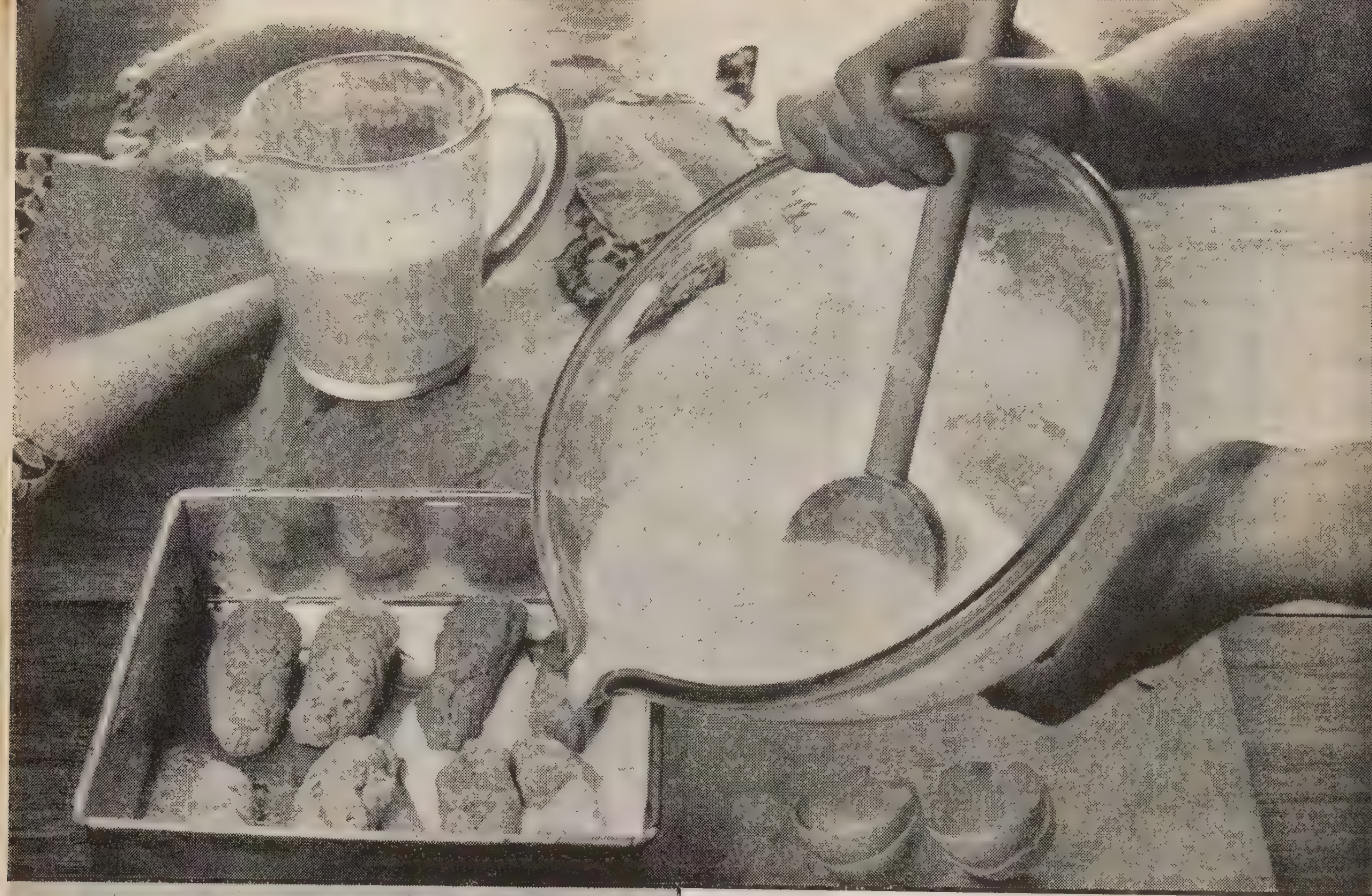
Flowering crabs make an attractive display of blossom in spring. This variety is *Pyrus (Malus) arnoldiana.*

Looper caterpillars are very troublesome on a variety of garden plants, including geraniums, dahlias, tomatoes, raspberries, salvias, and pot marigolds. The caterpillars, which grow up to $1\frac{1}{4}$in. long, are light green with white and darker green stripes down their backs and sides and smooth, hairless skins. They are the larval stage of the silver-Y moth. On geraniums the caterpillars eat patches out of the lower sides of the leaves, but leave the upper skin (epidermis), which remains stretched across the holes like thin tissue paper. Later this dries and falls out, leaving large, unsightly holes in the leaves.



Looper caterpillars have a curious way of moving about. Instead of wriggling along like most caterpillars, they arch their bodies and progress in a series of loops—hence their name.

Loopers can be controlled readily by spraying with lead arsenate (which is poisonous) at the first sign of attack or by dusting with D.D.T. or derris.



Above—Batter being poured over sausages which have been skinned, rolled lightly in flour, and placed in a baking dish containing very hot dripping. Below—The baked dish ready to be served.

BATTERS TAKE

A BATTER, as its name implies, is a mixture which is beaten. By thorough beating, air is incorporated with the mixture and this air expands during cooking, making the finished product light. Air is introduced by adding eggs and then beating the flour mixture or by beating the eggs first and then adding them to the mixture. The texture of the product depends on the amount of air introduced, which means that the quality of the beating is a decisive factor. In this article Eva Topping, Rural Sociologist, Auckland, describes the making of batters and some of the uses to which they can be put.

BATTERS vary in thickness from the thin "pouring" type used for fried pancakes and Yorkshire puddings to the thick "drop" kinds which make gems, sponge puddings, and similar products. Milk, flour, and eggs are the principal ingredients of any batter; sugar, flavourings, and fats are added to give diversity of textures and tastes. If fats are included, they are liquefied before being blended into the mixture.

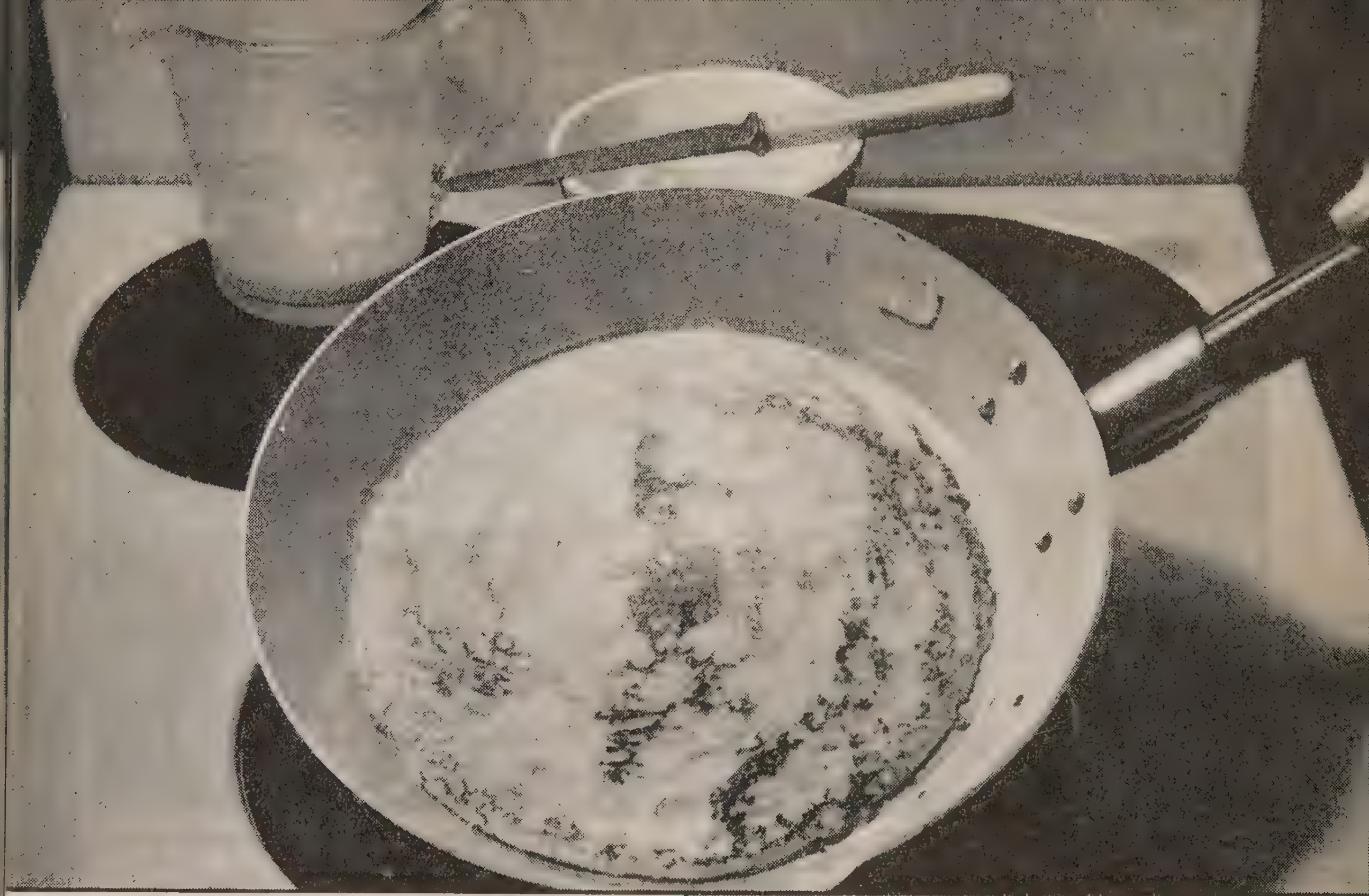
Thin Pouring Batters

A thin batter is made in one of two ways: Either the eggs are broken into a well in the flour, or they are separated, well beaten, and then added to the liquid mixture.

Yorkshire and batter puddings are an example of the first method. Here are the standard recipe and method for batter pudding:—

4oz. of flour
1 large egg
½ pint of milk
Pinch of salt
About 1 tablespoon of dripping

Sift the flour and salt into a mixing bowl, make a well in the flour, break the egg into the centre, and stir with a wooden spoon, adding half the milk gradually. Stir until the mixture is smooth, then beat it well for 5 minutes and stand it aside in a cool place for at least 20 minutes.



SOME BEATING

Heat the dripping in a shallow roasting tin or fireproof dish until it is very hot, moving the dish so that the sides are greased. Stir the remaining milk into the batter, pour it into the hot baking dish, and cook it in a hot oven for 20 to 30 minutes.

This recipe makes a Yorkshire pudding for serving with roast beef, but it can also be used for toad-in-the-hole and sweet puddings. For sausage toad-in-the-hole, skin the required number of sausages and roll them lightly in flour. Arrange the sausages in the dish when the dripping has heated, then pour the batter around them and bake it as for the Yorkshire pudding. Convenient-sized pieces of rump steak or fillet of veal make variations for toad-in-the-hole.

For a sweet course the batter pudding can be baked in a pie dish, using very mild dripping or butter for melting in the dish. Serve it with a sweet sauce made with marmalade, jam, syrup, or honey.

Apple Batter

1 egg
2oz. of flour
2 teaspoons of sugar
¼ pint of milk
¾ cup of sliced apple

Sift the flour and salt into a basin and stir in the sugar. Make a well in the centre and drop in the egg. Add a little of the milk and stir well, drawing in the flour from the sides gradually. Beat the mixture well, adding the remainder of the milk slowly, and stand it aside for an hour. Heat a little butter or mild dripping in a pie dish and see that the sides are well greased. Add the sliced apple to the batter, pour it into the dish, and bake it in a hot oven for half an hour. Dredge the pudding with a little fine sugar just before sending it to the table. Tender, young, red rhubarb cut into small pieces may be used instead of apples if preferred.

Fried Pancakes

Pancakes provide an example of the second method of making a pouring batter, for they are lighter and more

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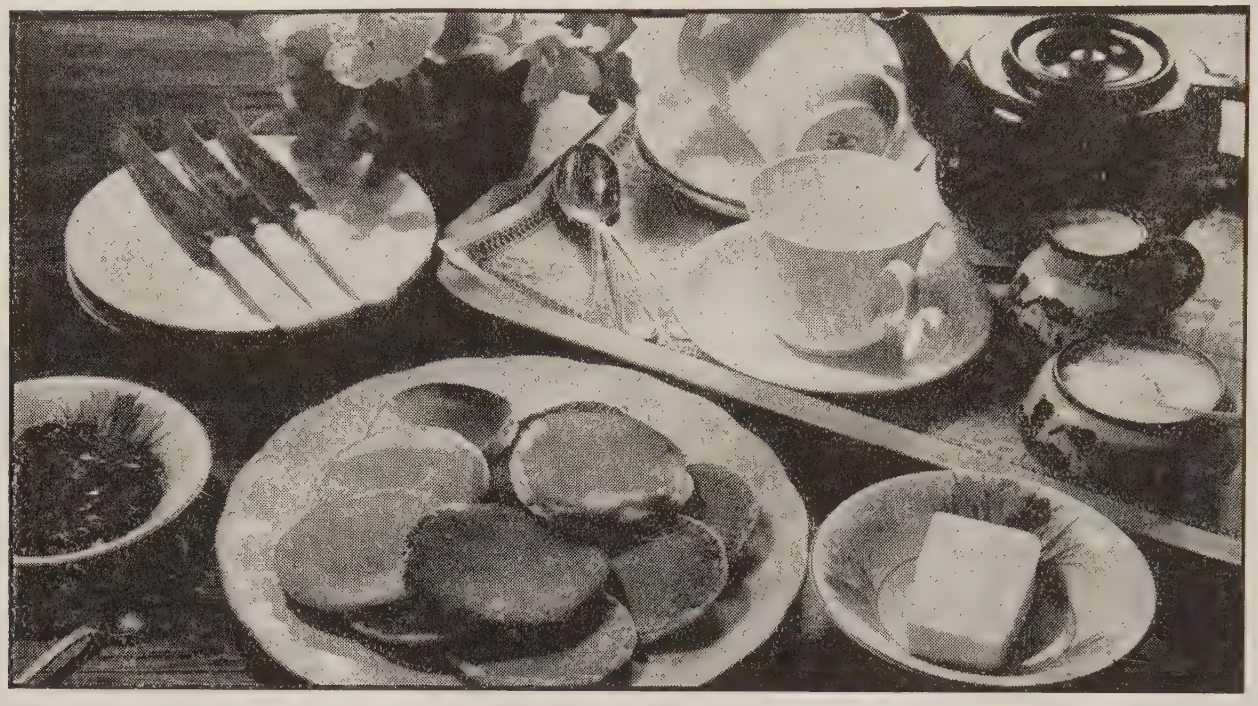
Photographs reproduced on this and opposite pages by Sparrow Industrial Pictures Ltd.

Above—After being cooked on one side, the pancakes are turned or tossed to be cooked on the other side. Below—They are then turned on to a sugared paper, sprinkled with lemon juice, and rolled up.



[*Sparrow Industrial Pictures Ltd. photo.*

Pikelets are made from a thick pouring batter.

tender if the eggs are separated. The stiffly-beaten whites are folded into the batter after it has been well beaten.

1 teacup of flour
1 egg, separated
½ pint of milk
Pinch of salt
Lard or mild dripping for frying
Lemon
Sugar

Sift the flour and salt into a basin, make a well in the centre, and drop in the yolk of the egg. Stir in the flour gradually, adding half the milk, and mix them to a smooth batter. Beat it for five minutes, then mix in the remainder of the milk and leave the batter to stand for an hour. When ready to fry the pancakes beat the egg white until it is stiff, then lightly stir it into the batter.

Melt a little lard or clarified dripping into a small, smooth frying pan, turning the pan so that the bottom is completely covered and there is fat a little way up the sides. When a faint smoke rises pour in sufficient batter just to cover the bottom of the pan. Fry it until it is browned underneath, then toss it or turn it with a knife and fry it on the other side. Turn it on to a sugared paper, squeeze lemon juice over it, dredge it with sugar, and roll it up or fold it in half. Keep the pancakes hot while the rest are being fried and serve them immediately.

Batter for Fritters

Fritter batter should be light but thicker than in the foregoing recipes. It should be thick enough to coat whatever it is intended to cover. It can be made with the whole egg beaten in, but is lighter if the white is whipped stiffly and folded in at the last minute before being used. Here is the recipe:—

2 eggs
¼lb. of flour
¼ pint of liquid
Salt

Separate the eggs. Sift the flour and stir in the beaten yolks and liquid gradually. Stand the mixture aside for an hour, then lightly fold in the stiffly-beaten whites. For oyster fritters their own liquor is the liquid used for making the batter. For whitebait milk or water is necessary.

If sweet fritters are required for the pudding course, the standard recipe is varied by adding 1 teaspoon of sugar, using milk or water for the necessary liquid. Coat the fruit in batter, drop it into deep, hot fat, fry it until it is golden brown, drain it on paper, and dust it with sugar. Serve it on a paper doily on a hot plate. Do not coat the fruit until ready to fry it and be sure that the fat is smoking faintly before the fritters are dropped in. Do not fry too many at a time or the fat will be cool and the fritters will be greasy. Serve them as soon as possible so that they remain crisp.

Apple fritters: Peel and core the fruit and cut it into rings ¼in. thick.

Banana fritters: Peel and split the bananas lengthwise and cut the halves across into two or three pieces.

Orange fritters: Peel the oranges, separate them into sections, dip them in icing sugar, then coat them immediately before the sugar has time to melt.

Preserved fruit should be drained well before being coated with batter.

Coating Batter for Fish and Meat

Batter for coating fish and meat can be made without eggs, but it will not be so light.

Use 2 heaped tablespoons of flour, salt, pepper, and ¼ pint of milk. Stir the mixture until it is quite smooth, using a fork instead of a spoon, as it helps to make the batter smooth more quickly. A pinch of baking powder stirred into an eggless batter just before it is used will make it lighter.

Use the batter to coat fillets of fish, chops, sausages, pieces of steak, or other meats which are to be fried.

Muffins

Muffins are also made from a batter-type mixture. Here is a standard recipe and method which may be varied at will:—

2 cups of sifted flour
3 level teaspoons of baking powder
1 tablespoon of sugar
Pinch of salt
2 eggs
1 cup of milk
4 tablespoons of butter, melted and cooled slightly

Measure two cups of sifted flour into a basin and add baking powder, salt, and sugar. Break two eggs into a well in the flour and stir thoroughly, adding the milk gradually. Add the melted butter or fat and continue mixing. The batter should be just soft enough to pour. Half fill deep bun tins which have been well greased and bake the muffins in a moderate oven (400 degrees) for 18 to 20 minutes. Serve them hot with butter and syrup or honey. Any muffins left over can be split, then toasted and buttered.

Bran muffins: Use equal parts of bran, white flour, and wholemeal instead of the 2 cups of white flour.

Ginger muffins: Add ¼ teaspoon of baking soda and ½ teaspoon of ginger to dry ingredients. Use ½ cup of syrup and ½ cup of milk and omit 1 egg.

Date or fruit muffins: Use only 1 egg and a little less milk. Add 2/3 cup of chopped dates or other dried fruit.

Pikelets

Pikelets or drop scones are made from a thick pouring batter. The mixture may include melted butter, but in times of rationing a recipe which omits this item is popular, and the pikelets never fail to please. Here is the recipe:—

½ cup of milk
1 egg
Pinch of salt
1 rounded teaspoon of baking powder
1 cup of flour
1 to 2 tablespoons of sugar, according to taste.

Sift the flour, baking powder, and salt into a basin (sifting twice helps to make better pikelets). Add the sugar, drop in the egg, and stir them well, gradually adding the milk. Tie a piece of suet in a rag and use it to grease the girdle or element. Drop the batter from the point of a spoon on to the heated girdle, cook it until bubbles are beginning to form, then slip a knife under it, turn it, and cook it on the other side. Place the cooked pikelets in a clean cloth as they come from the girdle and fold the cloth lightly over the top while they cool.

Gems

Gems are made from the thick drop type of batter and cooked in a special heavy iron pan. Put the gem iron into the oven to heat thoroughly; it is sufficiently hot when a little butter or other fat sizzles when put into the hollows. The recipe is:—

1½ cups of flour
1 tablespoon of sugar
1 egg
1 tablespoon of butter
3 level teaspoons of baking powder
¾ cup of milk
Pinch of salt

Sift the flour, salt, and baking powder and add the sugar. Drop in the egg and mix the milk in gradually. Add the melted butter and mix smooth. Melt a little fat in each depression in the heated gem iron. Divide the mixture evenly into the hollows and bake it in a moderate oven for about 10 minutes. Take care that the gem iron is really hot before putting in the mixture.

Ginger gems: Add ½ teaspoon of baking soda, 1 teaspoon of ground ginger, and 1 tablespoon of golden syrup to the recipe.

Batter Method for Cakes

The batter method is a quick way of mixing cakes and is excellent for the plainer varieties. Here is a recipe for a cake baked in three layers which uses this method.

Sandwich Cake

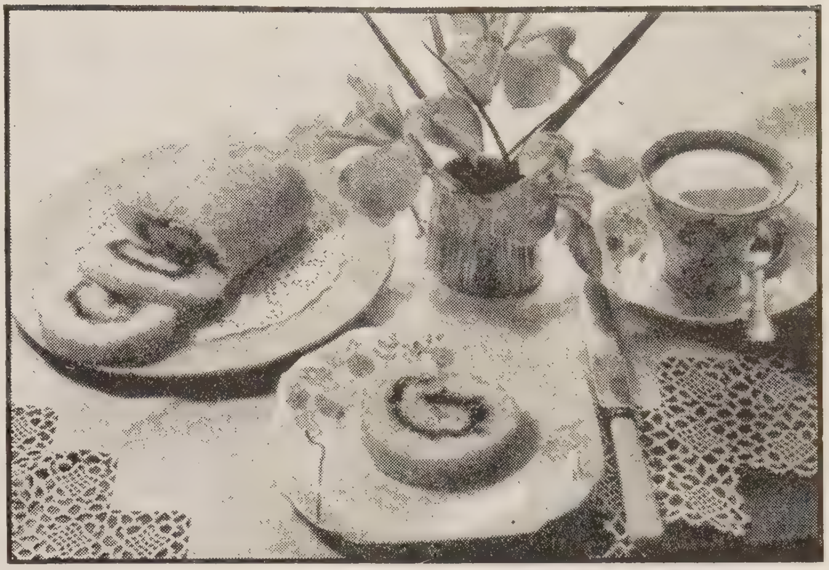
1¼ cups of sugar
3 cups of flour
1 egg
3oz. of butter
6 level teapoons of baking powder
Milk to mix

Sift the flour and baking powder and add the sugar. Break in the egg and stir in the flour gradually with enough milk to make a smooth, thick drop batter. Add the melted butter and mix it in thoroughly. Put the mixture into three greased and floured sandwich tins and bake it in a moderate oven until it is pale brown and evenly risen. When they are cool join the layers with jam, filling, or icing and ice the top. Passion fruit icing is specially good with this cake.

Sponge Roll

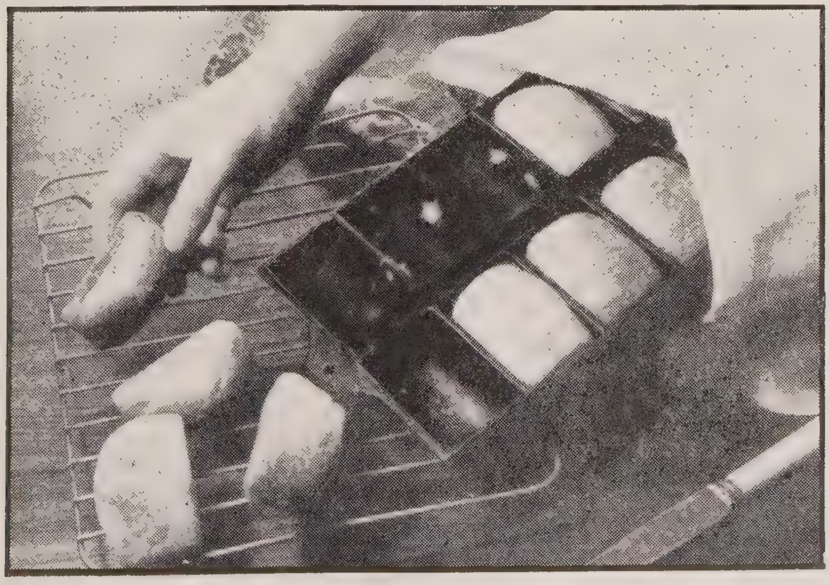
1 cup of flour
1 teaspoon of baking powder
2 eggs
1 cup of sugar
4 tablespoons of cold water
Pinch of salt

Separate the eggs and beat the whites until they are stiff. Beat the yolks until they are thick and paler in colour; add the sugar gradually, then the cold water. Sift the flour, salt, and baking powder and add them a little at a time to the yolk mixture. Fold in the stiff whites carefully and thoroughly. Spread the batter thinly in a shallow oblong tin which has been greased and floured. Bake it in a moderate oven (350 degrees) for about 10 minutes. Turn it out at once on to a slightly-damp cloth which has been sprinkled with sugar. Trim off any crusty or uneven edges with a sharp knife. Spread the sponge with jam and, while it is still warm, roll it up quickly and carefully. Leave it rolled in the cloth until it is cool.



[*Sparrow Industrial Pictures Ltd. photo.*

The batter method is a quick way of mixing cakes such as sponge roll.



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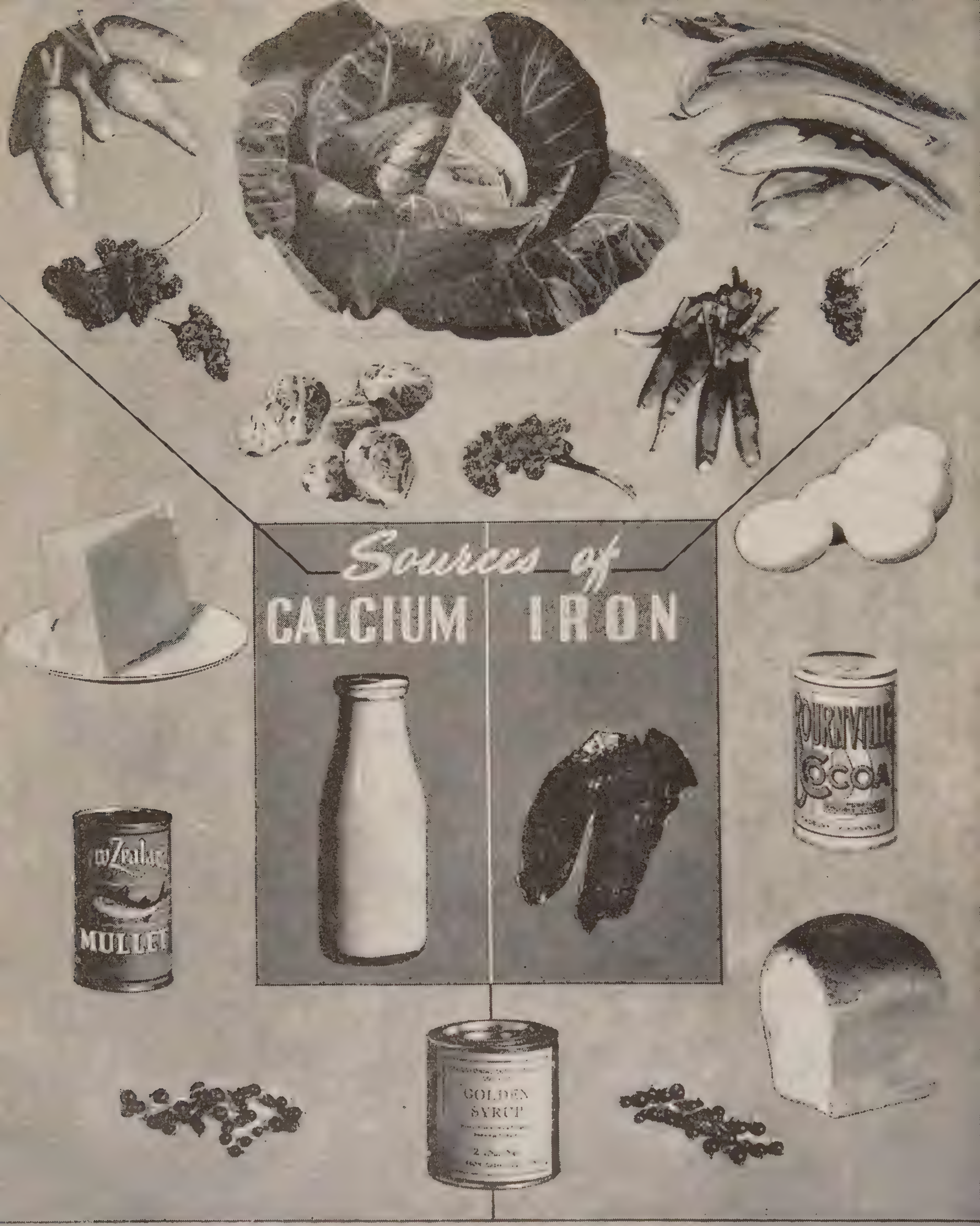
Gems are made from the thick drop type of batter.


Sources of
CALCIUM
IRON
MULLET
BOURNVILLE
COCOA
GOLDEN
SYRUP

SOURCES OF CALCIUM AND IRON

MILK AND LIVER ARE RESPECTIVELY THE RICHEST SOURCES OF CALCIUM AND IRON IN THE DIET. GREEN, LEAFY VEGETABLES AND SOME ROOT VEGETABLES ARE FAIR SOURCES OF BOTH.

Natural Mineral Resources

New Zealand
GOLDEN SYRUP

IMPORTANCE OF THEIR USE IN THE DIET

By EVELYN E. MOORE, *Rural Sociologist, Auckland.*

WHILE the answer to the question, "Do New Zealanders neglect their natural mineral resources?" must very often be "Yes," a question of greater moment is, "Are they so very important, anyway?" The New Zealand farmer is well aware of the mineral requirements of his stock; he is prepared to spend pounds annually on stock licks and other mineral preparations, even when there is evidence suggesting that they are necessary only in certain parts of the country with mineral-deficient soils. On the other hand he and his family often leave the supply of their own dietary essentials entirely to chance, though with so many refined foods of little nutritional value to choose from they are more likely to develop mineral deficiencies than the farm animals receiving their food in its natural state.

FORTUNATELY there are only a few of the minerals required for the complete nutrition of the body that may be deficient; the others are so widely distributed in foods or required in such minute amounts that all but the poorest diets contain adequate amounts of them. So the provision of a natural diet containing a plentiful supply of calcium, iron, phosphorus, and iodine, which are the minerals most likely to be lacking in the New Zealander's diet, automatically insures sufficient supplies of all the others.

Before being dogmatic about requirements of these minerals in the human diet, it is necessary to know something of the function of each in the body and to be able to state with some degree of certainty what constitutes a deficiency, and for this purpose it will be of advantage if each mineral is considered separately.

Calcium or Lime

Calcium is one of the minerals most likely to be deficient in diet. The poor condition of the average New Zealander's teeth, of which calcium is a major constituent, demonstrates this fact most vividly. Though a lack of calcium is not the only cause of dental decay, it is perhaps one of the most important, for, like the house built on weak foundations, the tooth with a thin framework cannot be expected to survive long.

Distribution of Calcium in Body and Foods

Calcium is very unevenly distributed in the body, over 99 per cent. of the total amount normally present being in the skeleton and teeth. It is equally unevenly distributed among staple articles of food, many of these being extremely poor sources, though others like milk, cheese, and some green vegetables contain it in relative abundance. This is one reason for a careful consideration of the daily requirement, as these foods, besides often being expensive or difficult to obtain, are among those against which there is often a prejudice and are therefore liable to be neglected.

Calcium or Lime Requirement

From earliest infancy it is important that the child should have an ample supply of calcium. With an inadequate amount the formation of bone from cartilage does not proceed normally and the bones remain soft and may become deformed. Though this condition, known as rickets, is rarely found in New Zealand, milder deficiencies do occur, about 14 per cent. of New Zealand schoolchildren having deformities in bone and teeth structure. The prevention of these is the mother's special duty. Before birth the child requires large amounts of calcium for the normal development of its bones. Moreover, calcium is essential for the clotting of blood and the consequent prevention of hemorrhages; it is necessary for the normal functioning of every cell in the human body, for muscle action, and especially for the tissues of the brain and nervous system.

Photographs in heading and on opposite page by Sparrow Industrial Pictures Ltd.

FOOD SOURCES OF CALCIUM . . .

This calcium must be obtained from the mother, and if there is not sufficient in her diet, it must come from her bones, which act as a reservoir for this and other minerals. If they are to be maintained in a normal state of calcification, the calcium content of the diet must be increased to meet the extra needs of the child. It has been shown that by doubling the normal requirement sufficient calcium will be provided for this purpose, though when the mother is nursing the baby her calcium intake should be even greater to protect both from the consequences of a deficiency. This need for calcium is, of course, maintained during childhood and adolescence, as the bones and tissues are still growing rapidly.

Though it would be generally agreed that it is important to have plenty of calcium during these periods of life, there is likely to be more scepticism over the requirements of the average adult. Large numbers of people who seem to manage very well with artificial teeth and others who confess to a negligible milk consumption, all in apparently good health, might prompt one to ask if it is worth making an effort to maintain calcium supplies in the diet. The answer is irrefutably, yes! The results of reliable experiments, carried out all over the world, have shown that the amount of calcium used daily by adults, though less than that needed by children, cannot be reduced below a certain level. When the intake is less than this amount the bones are continually drawn upon to produce the extra calcium needed for maintenance. In time the internal supporting structure of the bones is reduced to the level where they become markedly fragile, and there will be a correspondingly deleterious effect on the teeth. It has also been suggested that this depletion of bone calcium may be the cause of some types of rheumatism.

Experiments on children and animals divided into equal and similar groups and fed high and low calcium diets respectively gave results overwhelmingly in favour of the high calcium diet. Animals grew more rapidly and had higher vitality and lived longer than their full brothers and sisters on the low calcium diets, while extra milk supplied in diets already considered adequate improved both the physical well-being and mental alertness of children.

Natural Versus Medicinal Calcium

The complicated character of the processes governing the absorption and utilisation of calcium by the body is often not fully realised. In order to absorb and use calcium properly, adequate amounts of phosphate and vitamin D must also be included in the diet, while there are several other substances which, when present in the correct amounts, aid its absorption. Consequently some of the salts of calcium which do not dissolve in the intestinal juices are not absorbed unless these other agents are present. In some calcium-rich foods such as milk, cheese, and eggs these substances are present in such proportions as to favour maximum calcium absorption. In addition they contain vitamins and other mineral elements which improve the diet as a whole.

The use of medicinal calcium, on the other hand, unless carefully controlled with relation to the rest of the diet, may produce an unfavourable ratio of calcium to the other minerals present, and so hinder rather than aid its absorption. In fact, the use of a large amount of calcium in proportion to the amount of phosphate present in the diet is one of the methods most frequently used for producing severe rickets in experimental animals.

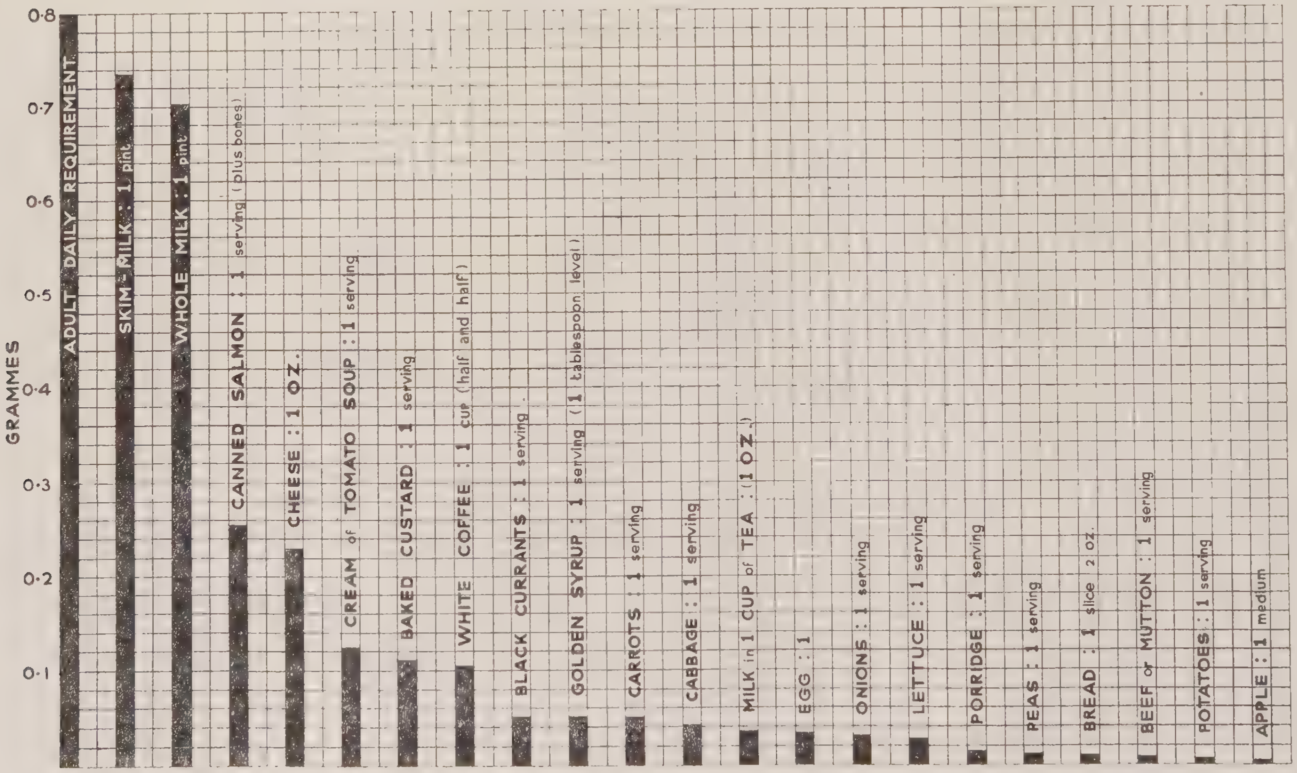
Calcium Requirements in Terms of Foodstuffs

Though the amount of calcium required daily (0.8 grammes for adults and 1.0 to 2.0 grammes for children and pregnant and nursing mothers) means very little without a set of food composition tables and plenty of leisure to calculate from them requirements in terms of the various foods, it is easy to remember that the consumption of one pint of milk daily, either whole or skimmed, will cover the requirements of adults. The consumption of 1½ to 2 pints daily will be sufficient for everyone else—children and pregnant and nursing mothers. Cheese and other foods rich in calcium may be substituted for part of the milk if desired.

Food Sources of Calcium

The diagram on this page shows that any attempt to obtain the daily requirement of calcium without recourse

PROPORTION OF ADULT'S DAILY CALCIUM REQUIREMENT IN COMMON FOODS



to milk and cheese is almost certain to fail unless the flavour and variety of the diet are completely unbalanced. Because of its bland flavour, however, milk may be incorporated in a great variety of dishes such as custards, sauces, soups and savouries, and the various gelatine desserts and ice creams.

It is preferable for children to drink milk, but there are many, especially those living on dairy farms and surrounded by a surfeit of milk, to whom the idea of drinking it is repulsive. For these there are the many alternatives mentioned already and they may also drink it disguised in coffee, cocoa, tea, or milk shakes. Other of the fair to good sources—canned fish, some vegetables, such as swedes and broccoli (although others, especially silver beet and spinach, should not be regarded as a good source of calcium), golden syrup, and the berry fruits—may be used to replace or supplement the milk when desired. Cereals, whether refined or whole, are poor sources of calcium, although they are valuable for the other nutrients they contain.

In further support of the need for plenty of calcium in the diet it is significant that wherever native races are of good physique they are invariably found to consume adequate calcium, either in milk or its products, fish (including the bone), or in some other calcium-rich foods.

To illustrate one way in which an adequate amount of calcium may be obtained, a day's menu which supplies sufficient calcium for an adult is printed below. (Good sources of calcium are set in black type.) The addition of two glasses of milk, as cocoa or milk shakes if desired, would make this also an optimum day's diet for a child.

Menu Supplying an Optimum Amount of Calcium.

BREAKFAST

Porridge and **milk** and sugar or **golden syrup**
Fried **French toast** and bacon. (White bread, egg, and milk.)
Toast
Butter
Marmalade
White coffee

LUNCH OR TEA

Pea soup
Vegetable and **cheese salad** (1oz. of cheese)
Tomato
Salad dressing
Bread and **date scones**
Butter
Jam
Tea with **milk**

DINNER

Boiled mutton
Carrots and white sauce
Potatoes, French beans
Baked caramel custard
Tea with **milk**

SUPPER

Fruit (fresh)

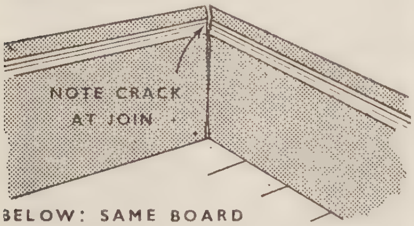
For comparison there appears on page 311 a day's menu apparently similar to the above and probably a fairly common one in New Zealand, but which supplies only just over half of the day's calcium requirement if milk (1oz. per cup) is taken in tea and less (about 3/8th) if it is omitted. (Good and fair sources of calcium are set in black type.)

DISHES WHICH SUPPLY ONE PINT OF MILK OR EQUIVALENT AS CHEESE IN ONE DAY'S MENU

[Sparrow Industrial Pictures Ltd. photos.

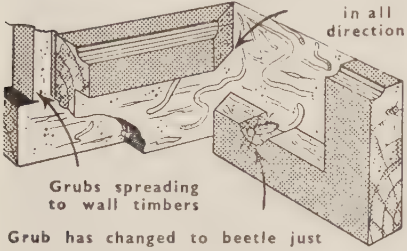
Why SERVICE is sometimes necessary after treatment

SOUND-LOOKING VARNISHED SKIRTING BOARD SHOWS NO SIGN OF BORER



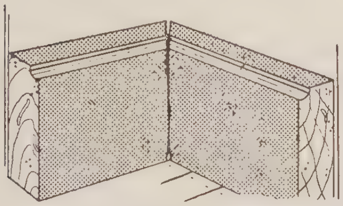
BELOW: SAME BOARD CUT OPEN SHOWS HOW BORER CAN BE BUSY UNDERNEATH VARNISHED SURFACE

Eggs laid in unprotected crack hatch into grubs which burrow in all directions



Grubs spreading to wall timbers

Grub has changed to beetle just below surface and is ready to gnaw its way out



IN TIME, UNSIGHTLY FLIGHT HOLES MAR PREVIOUSLY SOUND-LOOKING SURFACE

1 A Boracure treatment usually consists of (a) flood spraying and injecting the entire under-structure (which is very vulnerable to attack) and (b) injecting and otherwise treating infected parts elsewhere. However, there are obviously hundreds of places in a house which appear borer-free and thus do not receive treatment, such as the skirting board shown above.

2 But in some of these 'sound' looking places borer grubs may be busy beneath the surface.

3 Eventually these hidden borer grubs change to beetles and emerge from flight holes, this being the first sign of their presence. Because of the extended life cycle of the borer, these flight holes may not appear for some years.

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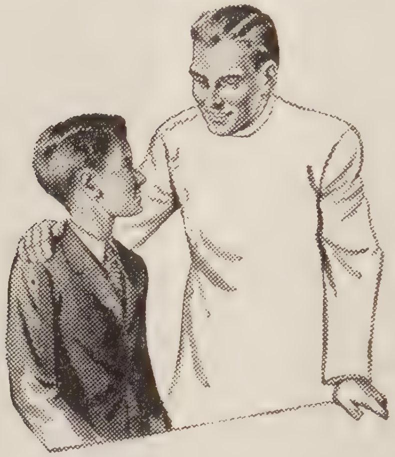

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SEAL OF QUALITY STANDARD SARGOODS

[*National Publicity Studios photo.*

Many people still obtain most of their vitamin D by exposure to sunlight, but infants and pregnant mothers need alternative sources of supply, and emulsions of fish-liver oils and concentrated preparations are available.

Menu Supplying only Half the Day's Calcium Requirement

BREAKFAST

Porridge and **milk** and sugar
Fried chops and gravy
Toast
Butter
Marmalade
Tea—**milk** optional

LUNCH OR TEA

Cold corned beef and salad
Lettuce
Egg (½)
Tomato
Potatoes
Salad dressing
Bread and biscuits
Butter
Jam
Tea—**milk** optional

DINNER

Roast mutton and gravy
Roast potatoes and **parsnips**
Silver beet
Jelly and stewed peaches
Tea—**milk** optional

SUPPER

Fresh fruit

From these two menus several points to remember if the diet is to contain adequate calcium may be discovered.

Breakfast: A milk drink such as coffee is to be preferred to tea.

The use of golden syrup instead of sugar on porridge adds variety as well as supplying an important amount of calcium.

Lunch: When there is a salad for lunch it should include cheese or be preceded by a milk soup. Tinned fish and savoury dishes such as scrambled eggs and macaroni cheese may be served instead to provide variety. If other luncheon dishes containing little milk or cheese are used, breakfast and dinner should provide some rich source of calcium.

There are many other ways in which milk may be included in the menu, and the housewife, even if she has a family which dislikes milk to drink, should find no difficulty in ensuring its presence on the menu; there is ample evidence to show that it is worth while.

Phosphorus and Vitamin D

Discussion of calcium requirements would be incomplete without mentioning phosphorus, which is present in the body as phosphate and vitamin D, which is necessary for proper utilisation of the calcium and phosphorus. Phosphorus, which with calcium forms the major part of bone, has many other functions in the body. It plays a very important part in the production of energy from food and is an essential constituent of all cells. It is, however, more widely distributed in foods than is calcium; meat, bread, and cereals, for example, are all good sources of phosphate, though they contain very little calcium. In consequence, diets are much less likely to be deficient in phosphorus, and by ensuring calcium supplies with such foods as milk, cheese, and eggs, phosphorus requirements are automatically safeguarded.

Vitamin D, the Sunshine Vitamin

The need for vitamin D is as great as that for calcium and phosphorus, especially in infants and growing children. Though it has now been isolated as a definite pure substance that can be seen, felt, and tasted if necessary, it is difficult to understand how such a very small amount of substance can have such far-reaching effects. Many experiments, however, have proved that it plays an important part not only in increasing the net amount of calcium and phosphorus able to be absorbed each day (including the reabsorption of all the calcium secreted in the digestive juices as well as that absorbed directly from the digested food), but also in the proper formation of bones and teeth and the prevention of tooth decay.

Although vitamin D is so important for normal bone and teeth formation in children, it alone among the vitamins is not found in sufficient quantities in milk and other ordinary foodstuffs for their needs. It seems that man in his primitive existence relied upon exposure to sunlight for his vitamin D. The majority of people still obtain most of their vitamin D in this way, storing sufficient in summer for use during winter, but as the child born in temperate and cold climates, especially in winter, cannot obtain sufficient vitamin D by these means, another source is necessary. The New Zealand Plunket Society has provided this extra source of vitamin D in its various emulsions of fish-liver oils for infants and young children and concentrated preparations of vitamin D are also available.

It is important that babies receive an adequate supply of vitamin D during the months before birth, as it has been shown to be beneficial for them to start life with well-calcified bones. The mother, unless she has plenty of opportunity for sunbathing, should therefore consume extra vitamin D for both herself and the child during this period and while the child is being nursed to compensate as far as possible for the loss from her own body. **It should be remembered, however, that vitamin D can never be a substitute for calcium, nor can it reduce the calcium requirement.**

The amount authorities recommend for pregnant and nursing mothers is contained in two teaspoons of cod-liver oil. Concentrated preparations are available for those who find this oil repulsive. The consensus of opinion at present is that this is an optimum level and nothing is to be gained by increasing the dosage.

Though the pre-natal and nursing stages are the periods of a baby's life in which extra vitamin D is most useful, the bones and teeth are still growing and developing during childhood and adolescence, and there is sufficient evidence to show that the continued use of vitamin D has a beneficial effect on bone formation, especially in colder climates, and that any attempt to overcome the prejudice against it is worth while.

Function of Iron in Body

The graphic representation by the patent medicine trade of the effect of iron deficiency, together with the occasional cases of anaemia still occurring in the population, has probably familiarised the public with the fact that iron is one of the most important mineral elements required for health. Measurement of the amount required in daily diets so that there is no need for recourse to the medicine bottle at intervals has concerned experts for many years.

The chief purpose of iron is to maintain in the blood the red colouring matter (haemoglobin) which is responsible for carrying oxygen to the tissues for the breakdown of foods into energy and heat. As with calcium and phosphorus, there are small unavoidable losses of iron from the system every day, besides the other and often greater losses as a result of accidents, various diseases, and other causes. Iron must therefore be restored to the body to maintain the reserves for the production of haemoglobin and for other functions. For example, iron is present in muscle haemoglobin, a substance which can store oxygen in the muscles for use during exercise.

The effect of iron deficiency is anaemia, a condition in which the amount of haemoglobin (containing iron) in the red blood cells is reduced, thus lowering the ability of the cells to carry oxygen. In more severe cases the number of cells is also reduced. The normal production of energy in the tissues is thus hindered, and an additional strain is placed on the heart when it endeavours to pump the blood more rapidly through the body and lungs so that the limited capacity of the blood to pick up oxygen is used to its fullest extent. The result is the feeling of tiredness and breathlessness so often associated with anaemia.

Other types of anaemia in which iron is not the primary deficiency require other and specific medical treatment.

Prevention of Iron Deficiency

Anaemias caused by iron deficiencies are most common in children under two years, adolescent girls, and in women during pregnancy and middle age. Before birth the infant builds up a large store of iron for use during the first six months of life, when its diet is milk, a very poor source of iron. If the mother's reserves have been low, or if her diet has contained inadequate amounts of iron, the child's stores may be low and anaemia may develop before the age when other iron-containing foods become a normal part of the diet. The non-inclusion of sufficient iron-containing foods, such as egg yolk, in the diet after the first six months of life may also produce anaemia.

During pregnancy and adolescence, when the requirement of iron is greater than it is normally, plenty of iron-rich foods such as eggs and liver should be included in the menu, though it is sometimes recommended that medicinal iron be given during the latter half of pregnancy and that the choice of food be made with reference to other considerations.

Copper is another mineral which is recognised as necessary in minute amounts for the prevention of anaemia, but it is so widely distributed in foods in the amounts required for health that any normal diet containing sufficient iron would also have sufficient copper. It is only in special cases of disease which require large amounts of medicinal iron that extra copper may also be recommended.

The Iron Requirement

The recommended daily allowance of iron, 12 to 15 milligrams, can easily be attained by the regular use of eggs, liver and kidney, green and root vegetables, berry fruits, and whole-grain cereals. Liver, perhaps because of the frequency with which hydatids occurs, is often regarded with suspicion by farmers who kill their own meat, and even sound livers are thrown out and wasted, presumably on the principle that it is better to be sure than sorry. Actually, if dogs are allowed to eat the discarded livers raw, more harm than good may result, as it is by the primary infection of the dog and then of the animal or human being that hydatids is carried. Well-cooked livers are completely harmless under all circumstances, and even if a slightly-diseased liver is accidentally eaten, it can do no harm, as humans cannot be infected directly with hydatids from diseased meat.

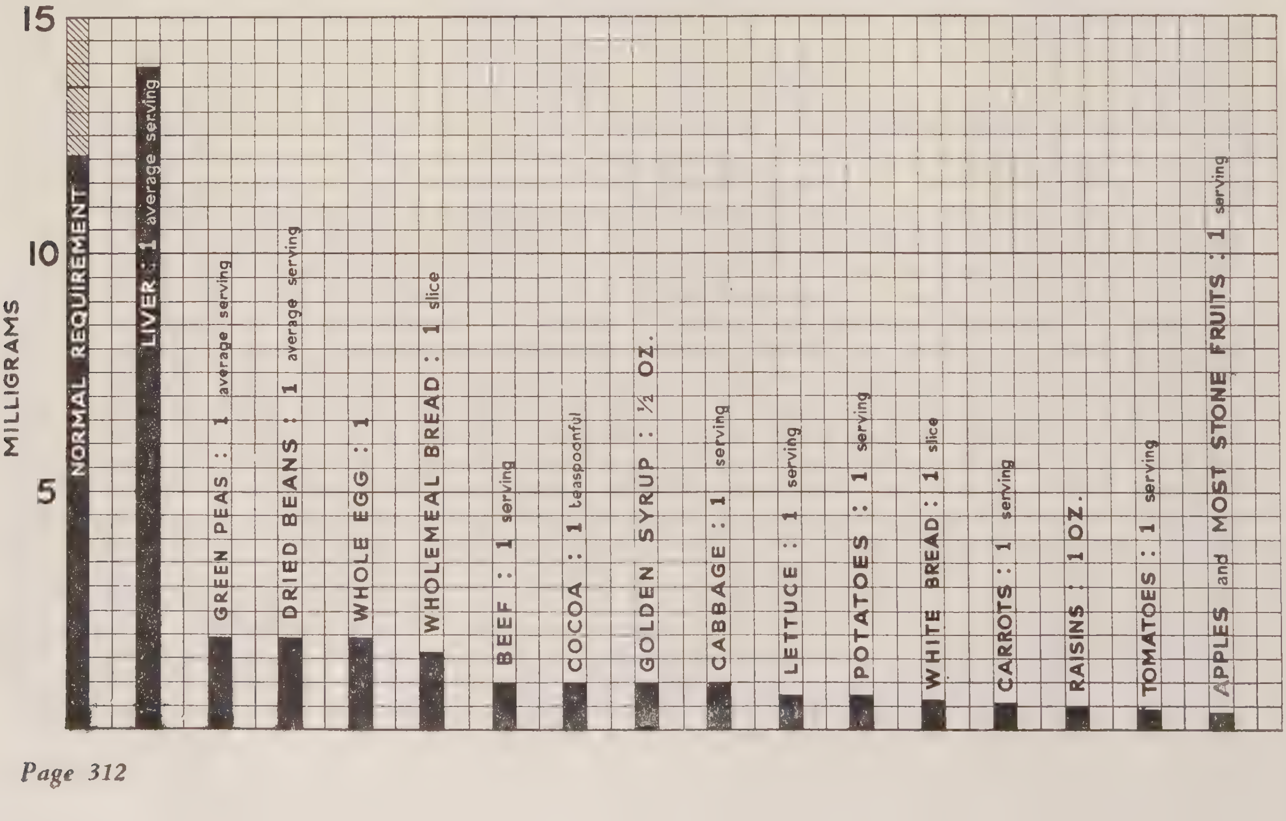
Apart from effecting a saving of meat during this period of food shortage, liver is one of the most valuable foods nutritionally. Not only is it the richest source of iron, but it is also a good source of vitamins A and B and other essential nutrients.

Other good sources of iron are golden syrup, treacle, cocoa, and dried beans, peas, and lentils.

Farming families who have the opportunity to grow their own fruit and vegetables, kill their own meat, and obtain ample supplies of whole and skim-milk should make full use of these natural advantages, as they will pay good dividends in resultant improved health and vitality.

PROPORTION OF DAY'S REQUIREMENT OF IRON SUPPLIED BY SOME COMMON FOODS

Requirement: Normal adults, 12 milligrams; adolescents and pregnant and nursing women, 15 milligrams.



COVERING CUSHIONS

IF furniture were tailored to fit exactly the people using it, cushions could be dispensed with or, as sometimes happens now, used only as ornaments. But most every-day chairs can be made much more comfortable by the addition of cushions—firm ones to compensate for sagging springs, soft ones to pad sharp corners and rest tired backs. In decorating a room, too, cushions are valuable assets. Almost every home has some cushions which would look much better if given new coverings, and instructions for that work are contained in this article by Norma K. Metson, Rural Sociologist, Wellington.

[*Photo News Ltd. photo.*

CUSHIONS are small compared with a room as a whole, so bright materials can be used for their coverings—gay patterns, stripes, and plain hues which will accent or provide a contrast to the main colours in the room. For cushions to be used directly on the floor, durable coverings in darker shades are more suitable, and every home will find a use for a few cushions with easily-washable covers which can be taken on to the lawn or veranda.

Covering Materials

Quite small pieces will provide the necessary material. A cushion is more useful if it can be used either way up, but undersides which normally will not show can be made of different material or carefully-joined sections. Cording, braid, buttons, or heavy pleating or frilling which would spoil the smooth surface of the cushion are to be avoided, as they would make it uncomfortable in use.

Suitable materials are the usual furnishing fabrics, particularly velveteen, tapestry, and firmly-woven, smooth-finished cottons or rayons. Crease resistance is a desirable quality, as it will keep the cushions looking fresh and unruffled even under heavy wear.

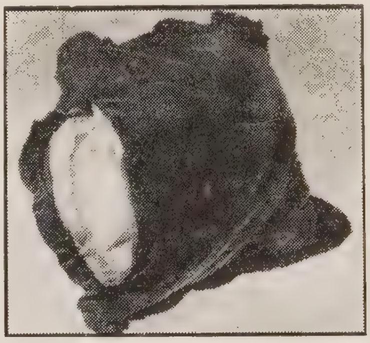
Choice of Fillings

Fillings for cushions can be of three kinds: Kapok or feathers, which make soft, light pillows; firm padding such as horsehair or tow for more substantial types; and the newer materials, coiled springs such as are used for upholstered furniture, and foam rubber, which is made in various weights and thicknesses and can be cut to the size and shape required. Cushions of this kind are used mainly for the seats of chairs and couches.

The inner cover—that is, the bag which holds the kapok or other filling—should be of closely-woven and durable material so that the contents will not work through and cause dust. Ticking, calico, or flour bags are suitable, and the cushion is filled firmly but not so tightly that it becomes hard and unyielding. Cushions of the tightly-padded and upholstered type with non-washable covers are sometimes made without an inner covering.

Covering a Plain Cushion

If a plain square, rectangular, or round cushion is to be covered, take the measurements along the seams and cut two identical pieces of material facing and on the straight grain. If there is a pattern, motifs should be centred or stripes matched. Allow for turnings in accordance with the type of material and the kind of seam required—½in. for a plain turn in with a cording, binding, or frill finish, and ¾in. for a french seam; a little more should be allowed if the material frays easily. Place the right sides of the material together and tack them on the seam line, inserting the edging at the same time. Machine the seam, leaving a section open along one side large enough for the insertion of the cushion. Put the cushion in, turn in the edges, and close the opening by hand stitching.



[*Photo News Ltd. photo.*

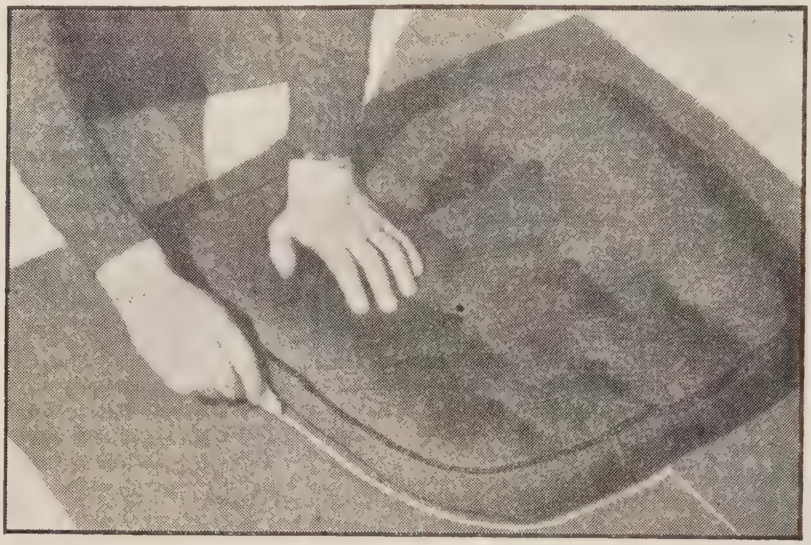
The frill is sewn to one side of the opening; the other edge (a selvedge in this case) is left ready to be turned in and slip-stitched by hand to close the seam.

Edging as for the square velvet cushion illustrated is made by using the machine attachment for frilling with the wider spacing. Material one and a half times the length of edging required should be allowed, as the frilling reduces the original length by a quarter to a third. Strips about 3in. wide are cut and joined with plain seams, then folded lengthwise and frilled, stitching about ¼in. from the edge. The frilling is tacked into the seam so that all four raw edges (two of frilling, two of material) come together, and some extra easing must be allowed at the corners to prevent

[*Photo News Ltd. photo.*

These three bedraggled articles were transformed into the smart cushions in the upper illustration by the methods described in this article.

COVERING CUSHIONS



[*Photo News Ltd. photo.*

If the cushion is shaped, make a pattern by drawing round the outline with chalk or pencil. The centre of the cushion lies on the straight grain line.

pulling at the outer edge. The final joining of the frilled strip, made when the exact length has been determined, should be inconspicuous and not at a corner. In the section of seam which is left open for the insertion of the cushion the frill is stitched to only one side and the other edge is left free to be turned in and slip-stitched by hand. The opening should be left in the centre of one side about 3in. from each end so that all four corners are included in the original stitching.

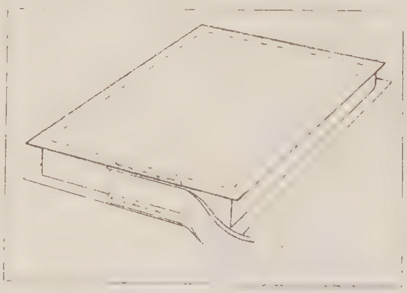
Tailored Cushion with Boxing

For shaped and firmly-padded cushions tailored covers are required. They are usually finished with cording, binding, or french seams. Cording or binding can be of a colour to contrast with the material of the cushion.

If this type of cushion is irregular in shape, it is wise to make a pattern in old material for the top and bottom sections. Mark the straight grain of the material, and place the cushion on it so that its centre falls along this line. Then draw closely round the cushion with tailor's chalk, marking its outline. Remove the cushion, cut out the pattern a little beyond the marked line, and fold it along the centre; trim it so that the two sides match and the final outline is smooth and regular and corresponds with where the final line of stitching is to fall. Using this pattern, cut two facing pieces for top and bottom of the cushion, allowing ½ to ¾in. turnings and marking carefully the stitching line round the outside of the pattern.

The boxing is made of straight strips joined to the required length. For a curved cushion the joins are made with inconspicuous plain seams at any point; for one with square corners they may be made to fall at the corners and corded. The width of the boxing strip is determined by measuring the thickness of the cushion and adding 1 to 1½in., which gives a turning of ½ to ¾in. on each side. Tack the top and bottom sections to the casing according to the type of seam to be used.

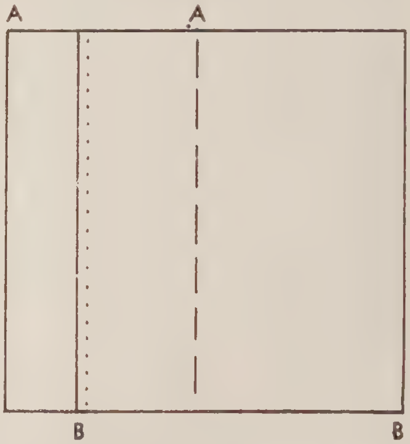
French seams were made on the cushion illustrated above. For these the first line of stitching is made on the wrong side ¼in. from the line marked for the finished seam, the cushion turned right side out, and the seam pressed back; the second row of stitching ¼in. from the edge leaves a narrow edging as a finish for the cushion.



The boxing strip is pinned to the top and bottom sections of the cushion cover.

The opening for inserting the cushion may have to be quite large if the cushion is of a type which cannot be folded or eased into the cover. A slide fastener inserted at the side seam or into the middle of the boxing at the back is very satisfactory for closing the opening. Other methods are finishing the seam by hand sewing, or finishing the upper side with the trimming that is being used, binding the corresponding edge of the boxing, and making a placket to close with hooks or strong domes.

Another type of closing which may be useful for this type of cushion is a wide, lapped placket on the underside which fits tightly enough and overlaps sufficiently to need no fastenings. For this the lower side of the cushion is made in two pieces which are overlapped about 6in. The edges of the overlaps are hemmed, and the two pieces tacked together to form a section similar in size and shape to the upper part of the cushion, as shown in the diagram. This method requires rather more material, but is convenient if the cover must be removed frequently for washing.



A lapped placket. A—Smaller piece, which laps under. B—Larger piece, which laps on top. The dotted line indicates the hemline of the upper piece.

Circular Cushion

A circular cover is very simple and quick to make. Two circles of material are cut, the first 21in. and the second 30in. in diameter. The larger circle is ruffled, again using the machine attachment, and stitched about ¼in. from the edge. This reduces the circumference of the larger circle to that of the smaller one and at the same time produces a curved effect which accommodates the depth of the cushion without the necessity for boxing. The two sides of the cushion are then sewn together with a plain seam.

Cording or a frill can be inserted in the seam, or the cushion made more decorative by quilting the smaller circle before it is made up. For quilting, a thin layer of dressmaker's cotton padding is tacked firmly between the cover material and an interlining of muslin or other light material. Guiding lines for the pattern of stitching required are marked lightly on the right side and then machined over, using a slightly-longer stitch and looser tension than for ordinary sewing.

Materials Used

To cover the velveteen cushion illustrated 1¾ yards of 22in. velveteen were required, for the tapestry cushion ½ yard of 48in. tapestry, and for the sateen cushion 1½ yards of 30in. sateen.

The directions given for these three cushions include most of the processes necessary for any type.

THE BUSINESS OF A WOMEN'S ORGANISATION

[*Sparrow Industrial Pictures Ltd. photo.*

NO organisation can progress very far without having to do some business—in fact, the very word "organisation" implies the orderly planning and carrying out of ideas by people who are "organised." This article by Eirene Unwin, Rural Sociologist, Dunedin, deals with the business part of group meetings, indicating its essential features, why efficiency is necessary, the duties of those who must take part in it, and certain methods of procedure which, by custom, have come to be regarded as "correct" and which have been proved to tend toward efficiency.

UNFORTUNATELY, in much group life the business is looked on by the majority of members as an imposition—only just necessary, to be put up with as it cannot be avoided, and to be hurried through so that the main topic of the meeting may be reached as soon as possible. But those same impatient members frequently fail to realise that, were it not for much patient carrying out of "business" by the group's officers, there would be no main topic, no meeting, no organisation at all.

Beginning a New Club

Sometimes people in a district would like to form themselves into a club, but are at a loss as to how to go about it. Usually it is necessary for one person to take the initiative and to call the first meeting. This person should approach someone connected with the larger organisation of which the club is likely to become a branch (preferably someone on its district executive rather than a local member from the next town), and ask her to tell the first meeting something of the possibilities of club life. If there is no larger organisation with which the future club will be connected, it is still advisable to invite someone with experience of club life to speak at the first meeting. The group should then formally constitute itself, elect its officers, and decide on its constitution or, if it is a new branch club, have the existing constitution explained.

At the first meeting members should decide what kind of activity they want at their next and subsequent meetings. A time, day, and place should also be fixed. Meetings can be held in the local hall or a room attached to it, in the library, in any other suitable building, or in members' homes, which has the advantages of spreading the burden of travelling to meetings evenly between all members, of allowing all members to make a real contribution to the life of the club by acting as hostess, and of engendering an informal, friendly atmosphere valuable to the spirit of community.

The Officers Necessary

Every group must have its chairman or president, who is in charge of all meetings and who directs and fosters the activities of the club. Equally important are the secretary, whose duties are manifold, and the treasurer who handles the club's money and whose office may be combined with that of secretary in a small club. If one of those officers is absent, another member must be appointed to take her place for the meeting.

Other officers frequently elected are vice-chairman, corresponding member, press reporter, chairman of sub-committees, patron, advisory members (when club members are young and inexperienced), and members in charge of the social period, competitions, sales table, or afternoon tea. The duties of these officers are decided by the club, but if those elected are wise they will organise the remaining members to assist them with their work. For example, the member in charge of competitions may ask a different member each meeting to think up, prepare for, and run the competition at their next meeting. Appointing members to such positions allows them to take an active part in club life. Many who would not be prepared to assume the duties of chairman or secretary frequently will discharge a minor office faithfully and well.

If the club is large, an executive committee will be necessary to carry out the instructions of the club and to deal with urgent subjects arising between meetings. However, it should keep the club informed of its decisions and activities and should not decide any controversial question without first putting it to the whole club; the committee is then bound by the club's decision and cannot reverse it at its next meeting, even if a majority of committee members wish to do so.

THE BUSINESS OF A WOMEN'S ORGANISATION . . .

Encouraging members to take turns in holding office is very wise. Usually it is bad for any club to have the same chairman or secretary year after year, for new officers bring new ideas and new vitality to the club.

The Chairman's Duties

The chairman takes the chair at all meetings—that is, she presides over and directs them. She should be familiar with the general procedure and conduct of meetings and with the rules of the organisation. She should arrive before the time set down for the opening of each meeting so that she may read over and, if necessary, discuss the agenda paper with the secretary, or she may do this by telephone earlier on the meeting day. She should open each meeting punctually after making sure that a quorum is present.

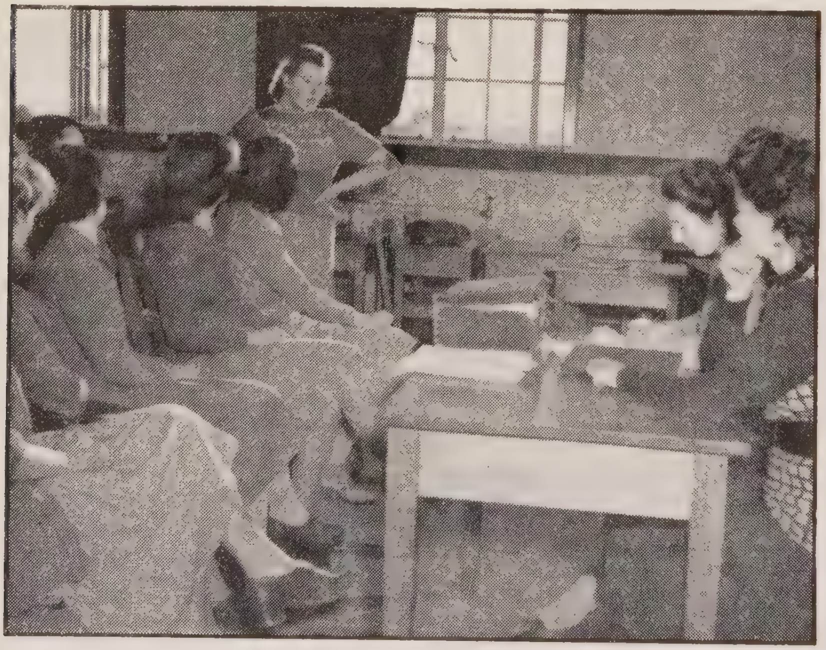
When the minutes have been read by the secretary the chairman asks those present if they agree that they form a true and correct record of proceedings. If anyone points out that the secretary has made a mistake, it can be corrected, and then the chairman signs the minutes as "Confirmed as read" or "Corrected and confirmed," adding the date. This correcting does not mean that members may disagree with previous decisions or actions of the group, but only that they may check the validity of the record the secretary has written. The chairman should sign immediately at the end of the minutes, leaving not even half a line in which anything extra could be written later. If space were left, and such an addition were made by some unscrupulous person, it might cause real difficulty in a club.

When the minutes have been signed the chairman proceeds with the business in the order set down on the agenda paper, calling on the secretary to read the correspondence. She must insist that throughout the meeting those speaking address the chair. She must allow all necessary discussion, but must check speakers who wander from the point, and must decide when sufficient discussion has taken place and the time has come to put a motion to the meeting and call for voting.

The chairman may vote on all motions and, if necessary, may also have a casting vote. That occurs only when a motion receives an equal number of votes for and against; then the chairman's casting vote will decide the issue. Sometimes it is wiser to postpone decision of a controversial issue to a later meeting when members will have had time to think it over and discuss it. It is wise for voting on such a subject to be by secret ballot.

There is no appeal from a chairman's decisions, which means she has considerable power. Hence she must be impartial and must not take sides in a controversy. She must also be able to make rapid and accurate decisions and should be tactful, good tempered, and courteous at all times.

Other duties that fall to the chairman are introducing visitors and, if they are speakers or demonstrators, announcing their subjects and afterward proposing a vote of thanks; the chairman may call on a member to propose the vote of thanks, but not without first having arranged with the member to do so.



[Sparrow Industrial Pictures Ltd. photo.

At a well-managed meeting the speaker always addresses the chairman, who ensures that she receives a proper hearing from members.

Any motions proposed by the chairman must be non-controversial, such as motions of sympathy. These need no seconder and are put to the meeting at once.

The Secretary

The success of a club depends very much on the secretary. An energetic, efficient secretary can make a club, whereas a careless or unmethodical one can retard its progress and succeed only in making its meetings uninteresting.

Her duties include receiving and answering all correspondence, and notifying each member of the date of each meeting, adding time and place if these vary. She must prepare an agenda paper, outlining the order of all business to be transacted at the meeting, lay it before the chairman, and, if necessary, discuss it with her before the meeting. All members should receive a copy of the agenda about a week before the meeting, sent out as the notice of meeting. That prepares members for the business to be dealt with, and no extra business should be allowed at the meeting if it is controversial, as members should be given time to consider such subjects, unless they are very urgent.

The secretary keeps the minutes of each meeting, which are a record of the transactions of the organisation and form its history. They should begin with the name of the club, date, and time and place of meeting. Then, leaving no space for any later incorrect additions, follows an account of the business of that meeting as follows:—

The number present and who presided;

The names of members who sent apologies;

The statement that the minutes of the previous meeting were read and confirmed;

An account of the business arising from the minutes;

A record of correspondence received and read and a note of how it has been or is to be answered;

A record of all the other business transacted;

A brief account of other activities of the meeting which do not form part of the "business," including the names of speakers or demonstrators and their topics.

The record of the business should include every motion, whether carried or lost, correctly worded, with the names of the mover and seconder; any salient points from the discussion of motions; and whether the motion was carried or lost. To have all these details correct, the secretary must take full notes during the meeting. Abbreviating these notes when writing up the minutes is easy, but remembering exact details not written down at the time is difficult. A wise secretary will write up the minutes within 24 hours of the meeting; as well as helping to ensure that the minutes are correct, that reminds her of any duties she must perform before the next meeting.

At the meeting the secretary reads the minutes of the previous meeting, and after they are signed continues

[Sparrow Industrial Pictures Ltd. photo.

A weak chairman may allow a meeting to get out of hand, with members arguing and chattering among themselves.

with the other business listed on the agenda, which she should present to the meeting briefly and promptly. Not all correspondence is necessarily read in full—frequently a summary may be given—but the whole of a complaint, however unpleasant or untrue, should be read; a grumbler should never be given the right to say that anything was suppressed.

Before the annual meeting the secretary prepares the annual report, frequently called the chairman's report—a misnomer, as she rarely writes it. The secretary obtains her information for the report from the minute book and after making a rough draft submits it either to the committee, if there is one, or to the chairman for discussion and approval. It should summarise all the club's activities during the past year, recording activities completed, but not all the details of planning and preparation which the minutes contain.

To make her work easier and more efficient a secretary should keep all her papers in an orderly manner. A simple method is to keep a single file on to which is clipped each new paper in chronological order. Letters and their replies should be kept together on such a file, but if a club has a great deal of correspondence, the secretary may prefer to keep a separate file for each set of correspondence, or she may keep such sets clipped together until each is complete, when it is added to the file. To have complete records the secretary must keep carbon copies of all letters she writes. She should also write brief reports of business conducted by telephone or at an interview, date them, and attach them to the file concerned.

Another aid to orderliness is an index to the minute book, in which case she should number the book's pages, head each new topic in the margin so that it may be found easily, and write up the index after each meeting. She should also keep a name and address book of members, and a roll on which to mark the attendance at meetings is sometimes a good idea.

At each meeting the secretary will need a copy of the agenda, her minute book, her address book (and roll if she keeps one), her files, and writing materials for taking notes. She should not be a muddler, with a confusion of loose papers, but an orderly, efficient, business-like person.

The Treasurer

More imagined fears than real ones are presented by the office of treasurer. It requires only a very small knowledge of monetary affairs and account keeping and a large amount of common sense.

She receives all money—grants, donations, or subscriptions—issues receipts, and, if the sum is more than a very few shillings, pays it into a bank account in the name of the club.

Before paying any bill she must present it to a meeting to be "passed for payment"—that is, read out, voted on and approved, and initialled by the chairman; she may then pay it.

The treasurer and one other member should be authorised by the club to draw money out of the account, and a copy of the motion appointing them should be sent to the bank. Signatures of both must be placed on cheques (if the account is with a commercial bank) or on withdrawal receipts (if it is with the Post Office Savings Bank, which is satisfactory for a small club).

The treasurer must keep an accurate record of all transactions—a "cash account." This must show the amount, source, and date of all money received, and the amount, purpose, and date of all money spent. The account should be balanced periodically—that is, total receipts and total payments to date added up and the balance or difference found. The balance as worked out from the cash book should correspond with the total held by the treasurer and deposited with the bank.

She should give receipts for every amount received, keeping counterfoils; receipts are best written in a duplicate receipt book so that counterfoils remain in the book. She should hold receipted accounts for all payments in excess of 2s. 6d.; these should be filed or clipped together in chronological or alphabetical order.

The treasurer should know exactly how the finances of the club stand, and should check expenses and extravagant spending. Though the initiation and fostering of money-raising or money-spending projects are not her duty, a good treasurer will be thoroughly interested in these and can do much to maintain the interest of members in club finances.

For the annual meeting she must prepare a receipts and payments account. This is a summary of all cash transactions during the past year, but it should not be so summarised that all the interesting information is left out. It is the mark of a particularly-good treasurer if she can so interest members that they ask questions about this account when it is read at the annual meeting.

Before the annual meeting her accounts must be audited—that is, some trustworthy person who either holds no official position or who has no connection with the club must check her cash book, receipt counterfoils, receipted bills, and cash in hand and ensure that they all tally. He must also have access to the minute book to check that all accounts paid have been passed for payment by the club. When he is satisfied that the receipts and payments account represents the true financial position of the club the auditor signs it, and it is ready for presentation to the annual meeting. An auditor should preferably be a person competent to advise on methods of keeping the cash book, making him a useful person to the inexperienced treasurer as well as one who may seem rather exacting.

A cash book and its summary (the receipts and payments account) for the annual meeting will meet the needs of most small clubs, but should the club have a large membership and handle much money, more elaborate

CASH ACCOUNT ANYWHERE YOUNG WOMEN'S CLUB

Date 1947	Receipts	£ s. d.	£ s. d.
Mar. 10	To Subscriptions		17 6
15	,, Donations		5 0
25	,, Subscriptions		10 6
			1 13 0
Apr. 1	To Balance b/d		16 0
	,, Proceeds from Bring and Buy		14 9
	Proceeds from Dance—Door takings	9 15 0	
	Donation	10 0	
	Ice cream stall	2 12 6	12 17 6
			14 8 3
May 1	To Balance b/d—In P.O.S.B	6 10 0	
	In hand	7 2	6 17 2
4	,, Subscription		3 6
29	,, Contribution toward field day expenses		16 0
			7 16 8

Date 1947	Payments	£ s. d.	£ s. d.	£ s. d.
Mar. 11	By Affiliation to National Organisation		5 0	
	,, Subscription to Journal		7 6	
	,, Minute book 2/3, Cash book 1/-, Receipt book 1/3		4 6	17 0
31	By Balance in hand c/d			16 0
				1 13 0
Apr. 7	By Hall hire		2 6	
11	,, Stamps 2/-, Stationery 1/6		3 6	
20	,, Dance expenses— Tea 4/- Sugar 10d.	4 10		
	Prizes 4/9, Hall hire £1/7/6, Presentation sprays 5/6	1 17 9		
23	,, Sliced bread 1/-, Cakes £1, butter 1/6, Orchestra £2, Ice cream £2	5 2 6	7 5 1	7 11 1
30	By Balance c/d—In P.O.S.B.		6 10 0	
	In hand		7 2	6 17 2
				14 8 3
May 4	By Travelling expenses, demonstrator		3 6	
29	,, Field day expenses— Train fares £3/17/6, Meals £1, Entry fee to show 16/-		5 13 6	
30	,, Affiliation fee to Basketball Club		5 0	6 2 0
	By Balance c/f—In P.O.S.B.		1 10 0	
	In hand		4 8	1 14 8
				7 16 8

The double columns allow sub-totals to be shown. They are not essential, but help to make the account clearer.

The extra column enables details of dance expenses to be shown and total dance expenses to be entered in the main payments column.

When a number of items in the left-hand column are added a line is ruled beneath them and the sub-total entered in the right-hand column opposite the bottom amount.

This cash book has been balanced monthly. That is not always necessary, especially if some months elapse with no money transactions. However, it should be done regularly and at least twice a year. At the end of the period all receipts, plus the balance brought down from the previous period, are totalled. All payments are totalled. The difference obtained must equal the amount held in the bank plus cash in hand.

The cash book shows the cash transactions of the club and indicates at each balance how much of the club's funds is held as cash in hand and as cash in the bank. It does not show deposits and withdrawals. The bank passbook contains the exact record of all club transactions with the bank.

C/d means "carried down," showing that the balance is to be "carried down" to the receipts side for the next month's account. B/d means "brought down," showing that the balance has been brought down from the payments side of the previous month's account. C/f means "carried forward," showing that the balance is to be carried forward to the next month's account, which will be on a new page; it will begin by showing the balance on the receipts side marked b/f (brought forward).

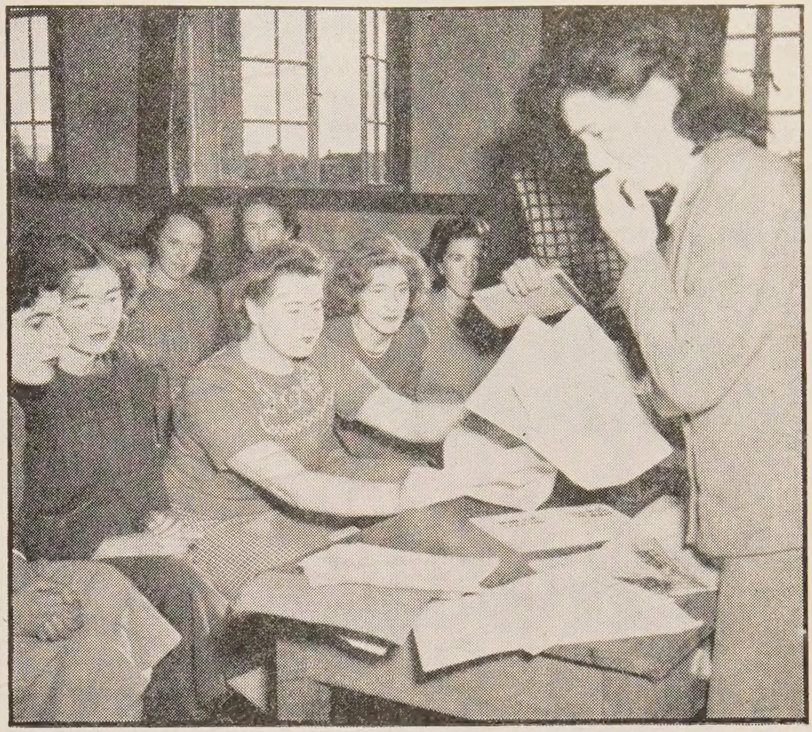
methods may be desirable. The treasurer should then consult and be guided by some person with a knowledge of book-keeping.

The Annual Meeting

Every club has an annual meeting, at which officers are elected. Some clubs require written nominations to be sent in to the secretary some days before the meeting, but in less-formal groups verbal nominations are taken at the meeting. In either case the nominee for each office has to be proposed and seconded, and she must give her consent to being nominated. If only one name is suggested, this person is "elected unopposed" and no official voting takes place. If several people are nominated, election should be by secret ballot.

The chairman is elected first, and as soon as the result of the voting is announced the retiring chairman vacates the chair and the newly-elected one takes it. She then presides over the rest of the meeting for the election of, first, the secretary, then the treasurer, and then the other officers. An auditor should also be chosen.

Before the elections the annual report and financial statement are read and adopted. Both may be discussed before adoption, and if any members feel dissatisfied with the work of their committee, then is their opportunity to voice that disapproval.



The inefficient secretary. Amid a jumble of papers on her table she cannot find the correspondence required.

Definitions

A **"quorum"** is the number of members specified in the rules of the club whose presence is necessary before any business can be transacted. For committee meetings it is usually one or two more than half the number of committee members. For club meetings the proportion can be smaller.

[Sparrow Industrial Pictures Ltd. photos.

Delegates to a meeting take notes of a member's remarks while the secretary keeps a record for the minutes.

"Business arising out of the minutes" should include subjects arising directly from decisions at the previous meeting. If there is likely to be more discussion or action about them, they should be included later in the agenda.

Rules of Motions and Voting

The term "motion" covers resolutions and amendments, because both can be "moved." The following rules should be noted:—

1. A resolution is a statement of opinion, and should be worded clearly and grammatically. A poorly-worded motion can cause unnecessary confusion and discussion. If a chairman considers a motion to be badly worded, she should ask the proposer to reword it.

2. An amendment is a suggested alteration to a resolution which must amend and not contradict it, either explicitly or implicitly, and which must be relevant. An amendment may alter by omitting words from or adding words to the original motion or by substituting one phrase for another. For example, the resolution "That this club wishes to assist with the formation of a school lunch service" may be amended by adding "in co-operation with the school staff," or by substituting for "wishes to assist with" the words "approves of the principle of."

But it could not then be amended further by adding "and recommends the staff to inaugurate one," as that implicity contradicts the original intention that the club should itself assist in the inauguration of the service. Such a contradictory amendment must be ruled out of order by the chairman, but she must give her reasons.

3. A motion must be moved and seconded before it can be discussed. If no one will second it, it is declared "dead" and the meeting disregards it.

4. All but the simplest motions should be written down and handed to the secretary for her to read to the meeting.

5. A resolution must not be negative. For example, "That this meeting does not approve of the present tendency for small country schools to be consolidated, and urges . . . " is incorrect. But it could be reworded "That this meeting disapproves of . . . "

6. A resolution must not reintroduce an issue that has already been decided. If a dissatisfied member attempts to overrule or nullify a previous decision by bringing in a contrary motion, the chairman should rule such a motion out of order.

7. When a motion is being discussed it is helpful for each speaker to preface her remarks by indicating whether she is "for" or "against" the motion. That makes it very much easier for everyone to follow the discussion.

8. When a motion has been proposed, seconded, and discussed, the chairman "puts it to the meeting," using some such expression as "You have heard the resolution (or the amendment); all those in favour please say 'Aye' [pause for members to respond]; those against 'No'." If it is not clear whether "Ayes" or "Noes" were more numerous, the voting should be repeated with a show of hands, these being counted by the chairman and secretary. Alternatively, the voting may be by secret ballot.

9. If an amendment is proposed, it should be seconded, discussed, and voted on before the main resolution. If it is carried, it is incorporated in the motion, and the motion as it then stands is read to the meeting before final discussion and voting.

10. There may be more than one amendment to a motion, but these should be taken in turn, each being voted on before the next is proposed, unless someone moves an amendment to an amendment.

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RECEIPTS AND PAYMENTS ACCOUNT ANYWHERE YOUNG WOMEN'S CLUB FOR YEAR ENDED FEBRUARY 28, 1948

Receipts	£ s. d.	£ s. d.	£ s. d.
Subscriptions—Current year		1 15 0	
In advance		3 6	
			1 18 6
Donations (other than to dances)			1 5 0
Proceeds Bring and Buy			14 9
Proceeds Sale of Work			2 11 6
Proceeds from Dances—			
Gross takings	12 17 6		
Less expenses	7 5 1		
Net profit		5 12 5	
Gross takings	14 2 3		
Less expenses	7 13 7		
Net profit		6 8 8	
			12 1 1
			18 10 10

Payments	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Affiliation fees: National Organisation 5/-, Basketball Club 5/-, Tennis Club 7/6			17 6	
Subscription to Journal			7 6	
Speakers and Demonstrators' expenses			12 6	
Field Days and Excursions, etc.—				
A. and P. Show—				
Gross expenses	5 13 6			
Less members' contributions	16 0			
Net expenses		4 17 6		
Inter-club meetings—Gross expenses		4 19 2		
Visit to Woollen Mills—				
Gross expenses	3 10 0			
Less members' contributions	1 0 0			
Net expenses		2 10 0		
			12 6 8	
Hall hire			7 6	
Postage, Stationery, etc.			15 3	
				15 6 11
Balance—In P.O.S.B.			3 0 0	
In hand			3 11	
				3 3 11
				18 10 10

At the foot of the statement of receipts and payments details of outstanding and prepaid items should be given. For example:—

	s. d.
Unpaid bills	8 6
Subscriptions in arrears	10 6
Subscriptions in advance	7 0

The method of presentation suffices for small clubs. If a club is fortunate enough to have the advice and interest of someone with accountancy training, either as auditor or in an advisory capacity, the annual presentation of the financial position in the form of an income and expenditure account and balance sheet is recommended.

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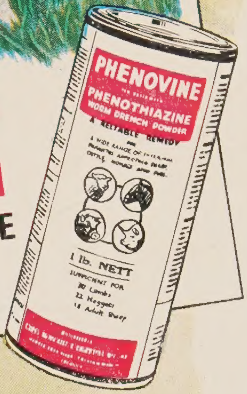
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